CLINICAL STUDY OF RHEGMATOGENOUS RETINAL DETACHMENT

Dissertation Submitted for

M.S. OPHTHALMOLOGY
BRANCH-III

Regional Institute of Ophthalmology
Madras Medical College
Chennai -600003

THE TAMILNADU Dr. M.G.R. MEDICAL UNIVERSITY
CHENNAI
TAMILNADU

APRIL 2014

CERTIFICATE

This is to certify that the dissertation entitled **" CLINICAL STUDY OF RHEGMATOGENOUS RETINAL DETACHMENT"** submitted by **Dr. A. SAVITHA** for the award of the degree of Master of Surgery in Ophthalmology by The Tamilnadu Dr.M.G.R.Medical University, Chennai is a bonafide record of the the work done by her in the Regional Institute of Ophthalmology, Government Ophthalmic Hospital, Egmore, Chennai, during the academic year 2011-2014.

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Finally I am indebted to all the patients in this series without whose cooperation this study would not have seen the light of the day.

INSTITUTIONAL ETHICS COMMITTEE
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CERTIFICATE OF APPROVAL

To
Dr. Savitha .A,
PG in MS Ophthalmology,
Regional Institute of Ophthalmology,
Madras Medical College,
Chennai-8.

Dear Dr. Savitha .A,

The Institutional Ethics Committee of Madras Medical College, reviewed and discussed your application for approval of the proposal entitled **"Clinical study on Rhegmatogenous retinal detachment"** No.16102013

The following members of Ethics Committee were present in the meeting held on 08.10.2013 conducted at Madras Medical College, Chennai-3.

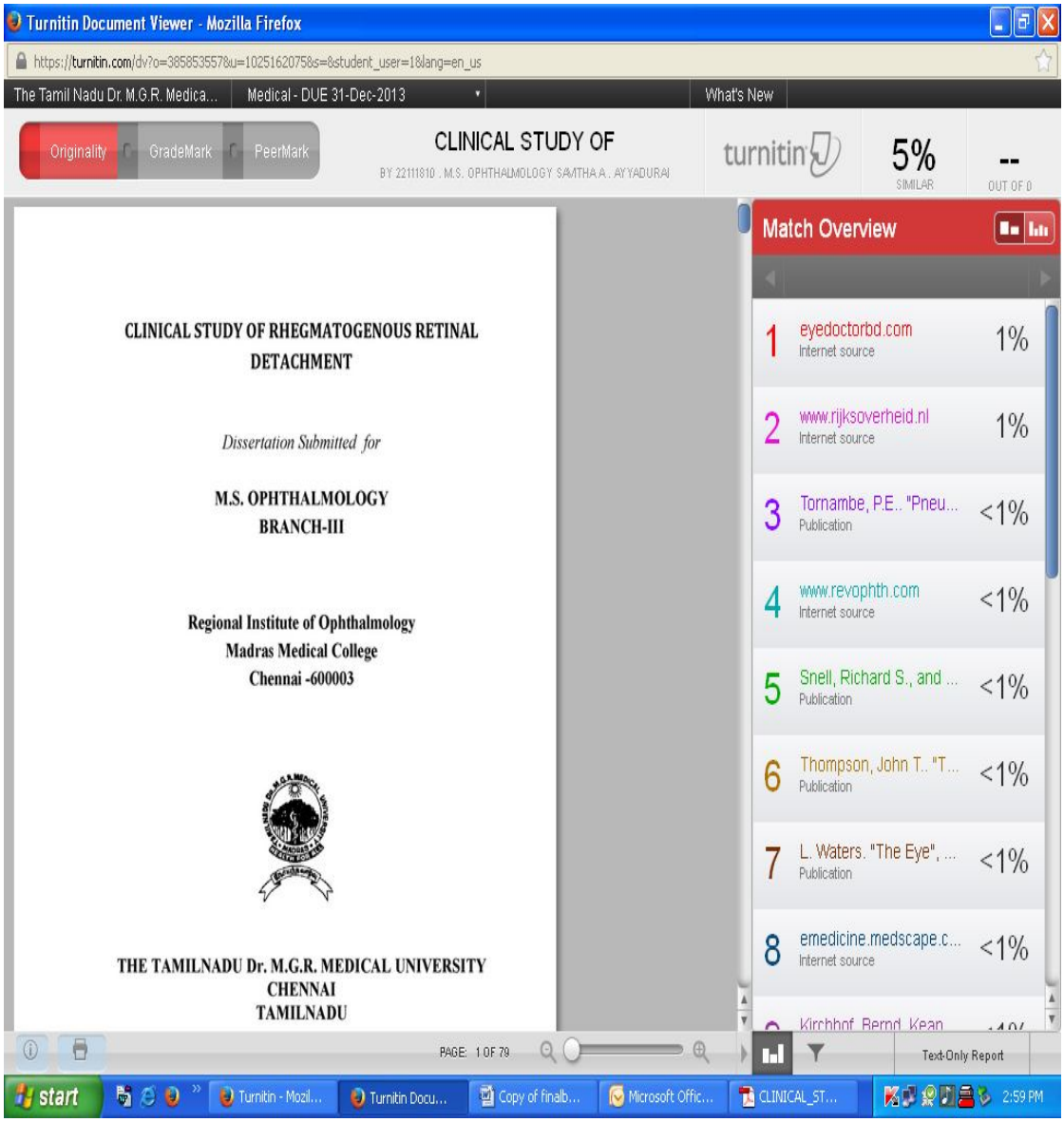
1.	Dr. G. Sivakumar, MS FICS FAIS	-- Chairperson
2.	Prof. Ramadevi, Director i/c, Instt. of Biochemistry, Chennai	-- Member
3.	Prof. P. Karkuzhali, MD Director of Pathology, MMC, Ch-3	-- Member
4.	Prof. Kalaiselvi, MD Prof. of Pharmacology, MMC, Ch-3	-- Member
5.	Thiru. S. Govindasamy, BABL	-- Lawyer
6.	Tmt. Arnold Saulina, MA MSW	-- Social Scientist

We approve the proposal to be conducted in its presented form.

Sd/Chairman & Other Members

The Institutional Ethics Committee expects to be informed about the progress of the study, and SAE occurring in the course of the study, any changes in the protocol and patients information / informed consent and asks to be provided a copy of the final report.

Member Secretary, Ethics Committee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CLINICAL STUDY OF RHEGMATOGENOUS RETINAL DETACHMENT Dissertation Submitted for M.S. OPHTHALMOLOGY BRANCH-III Regional Institute of Ophthalmology Madras Medical College Chennai -600003 THE TAMILNADU Dr. M.G.R. MEDICAL UNIVERSITY CHENNAI TAMILNADU APRIL 2014 1 INTRODUCTION A Retinal detachment describes the separation of the neurosensoryretina(NSR) from the Retinal Pigment Epithelium(RPE) caused by a breakdown of the forces that normally attach the NSR to the RPE.This results in the accumulation of subretinal fluid(SRF) in the potential space between the NSR and RPE. The entity of Retinal detachment is not pathological,but an anatomical accident,which may be the result of many causes.The...

DECLARATION BY THE CANDIDATE

I hereby declare that this dissertation titled "**CLINICAL STUDY ON RHEGMATOGENOUS RETINAL DETACHMENT"** is a bonfide and genuine Research work carried out by me under the guidance of Prof.Dr.R.Ravikumar M.S.,D.O, Professor Department of Retina Services,Regional institute of ophthalmology,Government Ophthalmic hospital,Chennai-600008.

Date

Place

Dr.A.SAVITHA,

ABSTRACT

Rhegmatogenous Retinal detachment is a condition that is associated with increased risk of visual morbidity.The various risk factors are Posterior capsular rent during cataract surgery,Myope,Trauma,YAG Capsulotomy,Family H/O RD,Fellow eye RD.The Major predisposing degeneration like Lattice degeneration,Snail track degeneration,focal pigment clumping are associated with increased incidence of RD.The Duration of Retinal Detachment and macula status upon presentation determines the functional successful visual outcomeTherefore a well organized systemic approach that is carried out with an awareness of early recognition of symptoms like floaters & flashes,reporting immediately can bring about good functional visual recovery.Hence a need for a study to know the risk factors of RD , to define the predisposing retinal degeneration in the fellow eye and its prophylactic treatment .and to analyze the Anatomical and functional visual outcome and cause of failure.

MATERIALS AND METHODS

This Study included 30 new patients reporting to the Retina clinic ,RIOGOH,who were primarily managed with External Scleral buckling procedure

using silicone explants.The Data of all patients will be collected on a proforma specially designed for this study and which includes detailed history,past surgical history,Anterior and Posterior segment examination,investigation and management by External sclera buckling using silicon explants.Prophylactic therapy given in other eye if needed in postoperative stay and follow up were analysed for correlation and recommendation.

RESULTS

In our study the maximum incidence of Retinal Detachment was among 50-60 yrs age grp(33.33%).Males were predominately affected(76.67%).

Right eye (60%) was more affected than left eye.12 pts(40%) presented within 1 month of Symptoms.14 cases (46.67%) had vision of less than <1/2/60.,while presenting preoperatively.Single break was seen in (56.67%).Horse shoe tear and irregular tear are common due to dynamic traction.Superotemporal quadrant is most common site of retinal break(48.57%).Total & Near total RD occurred in 17 cases(56.67).Macula was found detached in (80%) of cases upon presentation.Cryopexy with Encirclage & SRF drainage was done in most of the cases.93.33% attained anatomical reattachment.The cases which failed(6.67%) had risk factors like preoperative failure of localization of breaks & in another case redetachment following surgery due to new break.Most pt (46.67%) had good

postoperative visual acuity of 6/60-6/24.4pts(57.14%) had lattice with small round hole.4pt(66.67%) are treated prophylatically with barrage laser,other pts with cryopexy and Encirclage.Detached Macula on initial examination and late reporting of retinal detachment account for the poor visual outcome.

CONCLUSION AND RECOMMENDATION.

In our study of 30 patients with Rhegmatogenous retinal detachment ,the maximum incidence was seen in the 50-60 yrs age group.Majority of the cases were Males and mostly had Right eye preponderance.Most patient presented within 1 month of onset of symptoms.Posterior capsular rent was major risk factor followed by Myopes in our study.

Total (or) Near total rhegmatogenous retinal detachment predominated our study.Superotemporal quadrant had most number of breaks.Horse shoe tear was predominant break and majority presented with macular off status .Encirclage with cryopexy was the sheet anchor in the surgical intervention.Multiple lattice with pigmentary clumps with atropic round hole was major vitreoretinal degeneration in fellow eye.Barrage laser was the major prophylactic treatment,followed by cryopexy and encirclage. There was excellent anatomical attachment.The cause of failure was due to failure to seal the break and another due to redetachment with new Break.

Our study highlights that Modern cataract surgery techniques and with modern instrumentation if meticulously used greatly prevents the occurrence of PC rent.All pseudophakes with known risk factors should be called for periodic review for detailed fundus examination.

All myopes ,pseudophakes and aphakes should be educated on symptoms of flashes,floaters and to report immediately when symptomatic.

This study also emphasis the prophylactic treatment of abnormal vitreoretinal degeneration and those presenting with break in superior quadrant within Lattice at the earliest to prevent occurrence of Retinal detachment ,especially in Myopes.

This study also emphasis importance of screening patients and with known risk factor and their proper recognition and early detection plays a valuable tool in the management of rhegmatogenous retinal detachment.

KEY WORDS:Rhegmatogenous retinal detachment,Retinal degeneration,retinal break,Encirclage,Cryopexy,barrage laser

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PART I

ABBREVIATIONS

RRD	-	Rhegmatogenous retinal detachment
RPE	-	Retinal pigment epithelium
PVD	-	Posterior vitreous detachment
ECCE	-	Extracapsular cataract extraction
YAG	-	Yittrium Aluminium Garnet
ILM	-	Internal limiting membrane
PCO	-	Posterior capsular opacification
PVR	-	Proliferative vitreoretinopathy
NFL	-	Nerve fibre layer
SL	-	Slit lamp Biomicroscope
BIOM	-	Binocular indirect ophthalmo microscopy
IDO	-	Indirect ophthalmoscope
SRF	-	Subretinal fluid
ONH	-	Optic nerve head
GRT	-	Giant retinal tear
DACE	-	Drainage+Air+Cryo+Explant

CRAO	-	Central retinal artery occlusion
MPS	-	Mucopolysaccharidoses
PVR	-	Proliferative Vitreoretinopathy
RPE	-	Retinal pigment Epithelium
LATT	-	Lattice Degeneration
WWP	-	White without Pressure
AP	-	Anteroposterior
ED	-	Exudative retinal detachment
TD	-	Tractional retinal detachment
PRD	-	Pseudophakic Retinal Detachment
PVD	-	Posterior Vitreous detachment
IOL	-	Intra Ocular lens
IOP	-	Intra Ocular pressure
ROP	-	Retinopathy of Prematurity
PHPV	-	Persistent Hyperplastic Primary Vitreous

ERG	-	Electroretinogram
SF_6	-	Sulphur Hexaflouride
C_2F_6	-	Perflouroethane
C_3F_8	-	Perflouropropane
UES	-	Uveal effusion syndrome

INTRODUCTION

A Retinal detachment describes the separation of the neurosensoryretina(NSR) from the Retinal Pigment Epithelium(RPE) caused by a breakdown of the forces that normally attach the NSR to the RPE.This results in the accumulation of subretinal fluid(SRF) in the potential space between the NSR and RPE.

The entity of Retinal detachment is not pathological,but an anatomical accident,which may be the result of many causes.The spontaneous variety,also called idiopathic or serous, the detachment itself is the essential catastrophe and the casual lesion may be so slight as to escape notice even after the most careful search.

In the secondary variety the detachment is an incident ,an epiphenomenon,a matter of secondary interest in a clinical picture caused by a neoplasm,gross inflammation,proliferative retinopathy or some other pathological entity of obvious importance.

But it was recognised that the difference between the two classes is of degree rather than kind,that all detachments are secondary,the so called spontaneous variety being dependent on degenerative or

inflammatory changes,some times so slight as to be recognised not at all or with difficulty .

The concept of Retinal detachment is a misnomer. The retina as a whole is not involved, but their occurs a cleavage between the two primitive layers,the retinal pigment epithelium remaining attached to the bruch membrane,while inner neurosensory layer separated from it due to opening of a potential space of the primary vesicle. .It would be a paradox if a patient who has regained lost paradise after a successful cataract surgery , should again lose it to a retinal detachment.

The concept of Retinal detachment and our approach towards it has evolved a lot over the centuries,and an effort to trace it takes us through a journey in to the evolution of Modern Ophthalmology itself.

HISTORICAL BACKGROUND

The different concepts,various techniques of examination and different modalities in the treatment of Retinal detachment have undergone steady evolution since 17 th century.The various historical events are listed below

1722 Maitre Jan : was first to note the total retinal detachment in dead cow's eye.

1704 Mery : First did ophthalmoscopic examination of a normal fundus in a cat.

1722 St yues : observed visual field loss, Corresponding to the area of detachment.

1766 Morgagni : Noted retinal detachment in case of ocular trauma.

1805 Ware : First drained subretinal fluid.

1841 Sichel : First described retinal detachment as white vascularised membrane seen through pupil.

1851 Von-Helmholtz : Babbage first invented direct ophthalmoscope and von Helmholtz Reinvented the ophthalmoscope

1852 Ruete : Invented the monocular variety of indirect ophthalmoscope.

1853 Coccius : Noted the retinal tears and holes .

1853 Arlt and : Proposed theory of exudation & disturbance in

Von graefe choroidal circulation and distension of the globe caused retinal detachment.

1858 Mueller : put forward traction as a cause of retinal detachment.

1861 Stellwag : described theory of hypotony and advised & Donder bed rest.

1861 Girard Teulon : invented Binocular indirect Ophthalmoscope of Nonelectric variety.

1863 Von-Graefe : cut down the vitreous membrane with a needle .

1869 Iwanoff : opined that PVD, preceded RD

1870 De-Wecker : Had a opinion that retinal breaks caused RD and Jaeger

1882 De-Wecker : first discovered and used Galvano cautery to create aseptic chorioretinal adhesions but the cautery given was away from break.

1895 Deutschmann : performed injections into the vitreous.

1900 Tranta : Examined the retinal periphery by direct ophthalmoscope ,using his thumb nail for sclera depression.

1906 Dufour : Revised Leber's theory that retinal detachment was caused by Retinal break.

1911 Ohm : Following drainage of subretinal fluid, First performed intravitreal air injection for internal tamponade.

1911 Gullstrand : Introduced Reflex free ophthalmoscopy and discovered the optical principles of slitlamp biomicroscope.

1918-1925 Jules Gonin : first to insist retinal break produced retinal detachment and his application towards treatment of Retinal detachment, marked the golden era in the history of Retinal detachment.

Attempts to close retinal breaks by applying heat and chemicals in the region of the hole by ignipuncture.

1924 W.Lister : Proposed that reattachment does not occur In the presence of retinal hole.

1929 Vogt : aseptic chorioretinal apposition carried out by galvano cautery.

1933 Deutschmann : Described cryo surgery and did injection into vitreous.

1933 Lindner & Strampilli : first to do scleral buckling away from retinal break.

1937 Jess : First to buckle by suturing the gauze over the break overlying the sclera.

1938 Rosengren : Reported the use of intravitreal air and positioned patient for tamponade the break site,following SRF drainage

1942 Hruby : introduced a pre corneal concave lens for fundus examination.

1947 Schepens : was the Father of the modern RD surgery,who popularized Indirect ophthalmoscopy using scleral depression.

1953 El-Bayadi : Described a pre corneal lens for fundus examination

1953Ernst custodis: used a plomb for indentation over retinal break and popularised Scleral buckling with indentation.

1956 Meyer : discovered Xenon arc photocoagulation Schwickerath

1957 Schepens : Introduced radiofrequency diathermy and solid silicon explants for sclera buckling with encirclage.

1957 Goldmann : first invented three mirror lens for posterior segment examination

1957-58 Arruga : Used supramid thread as encirclage

1960 Maimen : Introduced the first ruby laser

1962 Cibis : Injected silicon oil into vitreous in RD.

1965 Lincoff : Refined custodis' technique by introducing cryotherapy and silicon explants for retinal detachment.

1967 Rutnin : Described periphery of normal fundus.

1969 Kasner : first did open sky vitrectomy.

1971 Machemer : Described the Vitreous Infusion Suction Cutter in the procedure of vitrectomy.

1972 Lincoff : gave tips for finding the retinal hole and Introduced cryotherapy and silicon sponge for retinal detachment.

1973 Norton : Described intravitreal SF_6 injection

1976 Lincoff : Described retinal buckling

1973 scott : Revived the injection of silicon oil into the vitreous.

1978 Machemer : found the role of retinal pigment epithelial cell migration in cases of proliferative vitreoretinopathy

1979 Lincoff : sutured GRT in retina using temporary balloon buckle.

1980 Lincoff e : First to describe the use of perfluorocarbon in vitreous.

1983 Retina society Terminology Classification of PVR got introduced

1984 Hilton & Grizzard : Introduced the term pneumatic retinopexy

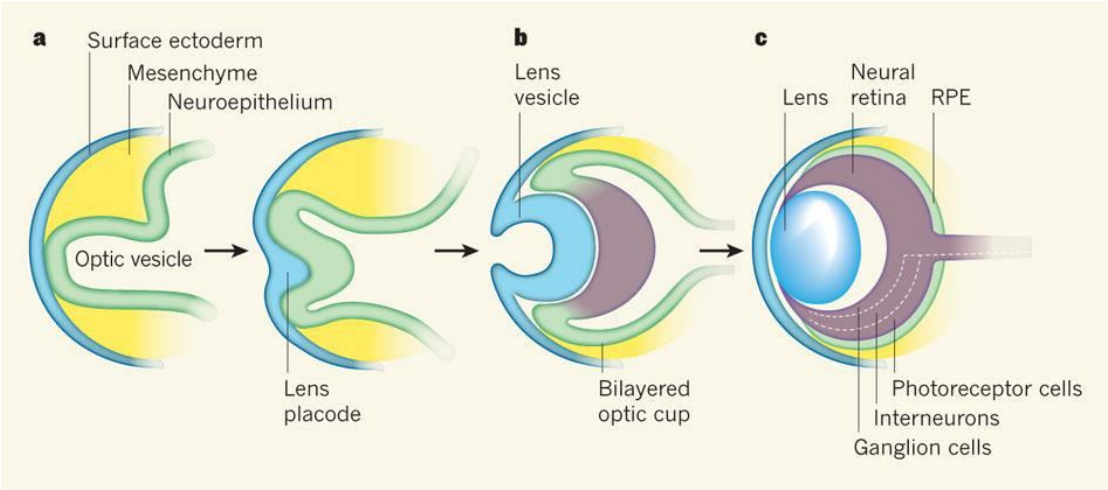
1990 : BIOM was introduced

1991 Higginbotham : Introduce Parsplana Sutureless Vitrectomy, using 25 guage.

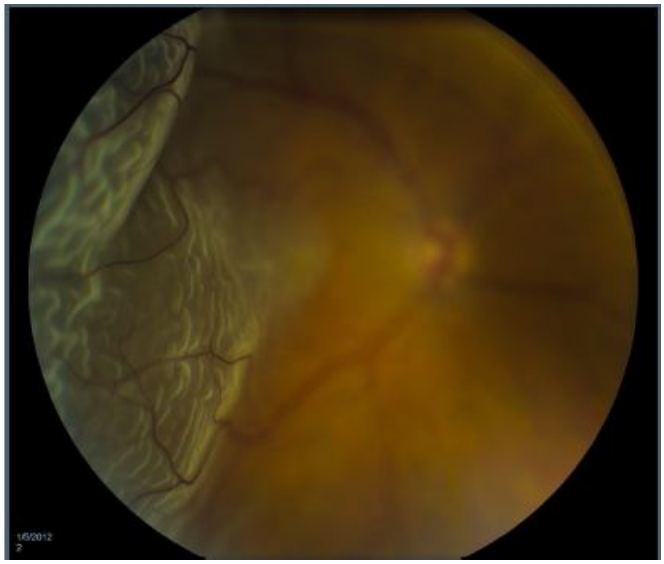
EMBRYOLOGY

The optic vesicle is formed by the lateral outpouching from the diencephalon by the 25th day of intrauteriene life.The proximal constricted portion forms the optic stalk and distal dilated segment forms the optic cup.By 5th week,optic cup involutes and groove appears in the inferior aspect of optic cup known as choroidal fissure.The hyaloids artery and surrounding vascular mesenchyme are enclosed in the optic fissure andthe optic stalk closes by 6th week.

Embrvology



Rhegmatogenous RD



By around 3rd wk of gestation,the outer layer of optic vesicle,composed of pseudostratified columnar cells with pigment granules forms the RPE Layer.The inner layer(neural retina)has a inner marginal and outer nuclear zones.

Mitosis occurs in the outer zone of the inner layer and completed by the 15th week,but the cells of future RPE continue to divide till late fetal life.As mitosis ends, differentiation begins and is initiated in the marginal zone.The cilia found in the outer nuclear zone of the inner layer disappears by the 7th week.

By the 7th week the neural epithelium has separated into inner and outer neuroblastic layers.The outer layer gives rise to horizontal and bipolar elements ,whereas the inner layer will produce ganglion and amacrine cells.Lamination is complete by 41/2 months and the ora serrata by 6 months. Cilia found in the outer nuclear zone,gives rise to photoreceptor layer.

ANATOMY

The Retina is a photosensitive layer that extends from the optic disc to the ora serrata.Beyond ora,it continues as a single layer of non-pigmented cells which covers the parsplana ciliaris.Retina is like a bowl wider at equator(24mm)than at the ora serrata(20 mm).The outer surface of the Retina is in contact with the Bruch's membrane& the inner surface of the Retina is in contact with the vitreous body. From the limbus,the retina extends 6mm on the medial side and 7mm on the lateral side.

THE 10 LAYERS OF RETINA FROM WITHOUT INWARDS

- The Retinal pigment Epithelium
- The layers of rods and cones.
- The External limiting membrane
- The Outer Nuclear layer
- The Outer plexiform layer
- The Inner nuclear layer
- The Inner plexiform layer
- The Ganglion cell layer
- The Nerve fibre layer
- The Internal limiting membrane.

The two principle attachments are at the Ora serrata and at the optic disc where all nerve fibers to continue as optic nerve.

BLOOD SUPPLY OF RETINA

It is derived from two sources. The outer retinal layers derives its blood supply by diffusion from choroidal vessels and the inner retinal layers till the outer plexiform layer derives its blood supply directly from branches of the central retinal artery. In retinal detachment there occurs separation of the neurosensory retina from the underlying choroidal vascular supply leading onto outer retinal degeneration.

RETINA AND ITS OPHTHALMOSCOPIC DIVISION .

Grossly the retina is divided into two distinct regions separated by equator:

a. Posterior pole and b. Peripheral retina

POSTERIOR POLE

It is the area of retina situated posterior to the equator.

It includes two distinct areas: Optic disc and Macula lutea

Optic disc

It is an circular area of 1.5 mm in diameter ,where all the retinal layers terminate except one layer(nerve fiber layer), which continues as

the optic nerve. The central retinal artery and vein emerge from the central depressed part called optic cup.

Macula lutea

It is around 5.5 mm in diameter. Fovea centralis (1.85mm in diameter) is the most sensitive and depressed part of the macula.Foveal avascular zone corresponds to the region devoid of retinal vessels. Foveola (0.35mm) is the central pit within fovea,where cones are densly packed. and it is situated around 2 disc diameters from the temporal margin of the optic disc and 1mm below the horizontal meridian.

Retina around the equator is called equatorial retina,ad the region anterior to thisis called anterior or peripheral retina.In far pheriphery,the border between retina &parsplana is called the ora serrata.periodic jetties of retinal tissue into parsplana,called dentate process,are more prominent over nasal peripheral fundus than temporal side.

PERIPHERAL RETINA

It extends from equator to ora serrata.

APPLIED ANATOMY

EQUATOR

The equatorial retina is the retina around the equator.

Surgical anatomy

The anatomical equator is an imaginary line located just anterior to the exit of vortex veins

ORA SERRATA

The ora serrata is the junction between the ciliary body and the retina. In the temporal ora, the dentate processes are blunt or absent ,where as nasal ora is characterized by tooth-like extensions of retina onto the pars plana (dentate processes) which are separated by oral bays.

Surgical anatomy of ora serrata

In the emmetropic eye, the ora is situated 7mm behind the limbus temporally and 6mm nasally.The ora externally ,corresponds to the insertion of the rectus muscles.

PARS PLANA

The ciliary body is situated 1mm from the limbus and extends posteriorly for about 6mm. The first 2mm named as pars plicata and the remaining 4mm , the flattened pars plana.

Surgical anatomy: The ideal location for surgical incisions is the parsplana,which is located 4mm from the limbus, not to endanger the lens or retina.

VITREOUS BASE

The vitreous base is a 3-4mm wide zone that straddles the ora serrata.

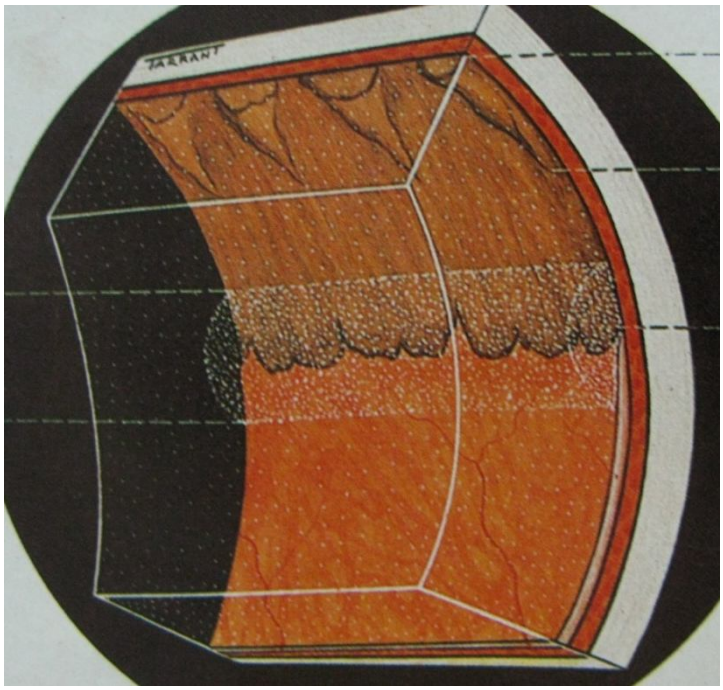
Surgical anatomy

An incision through the mid-part of the pars plana (4-5mm from the limbus) will usually be located anterior to the vitreous base.The collagen fibres of the vitreous base are densly adherent to the parsplana and the perioral retina.

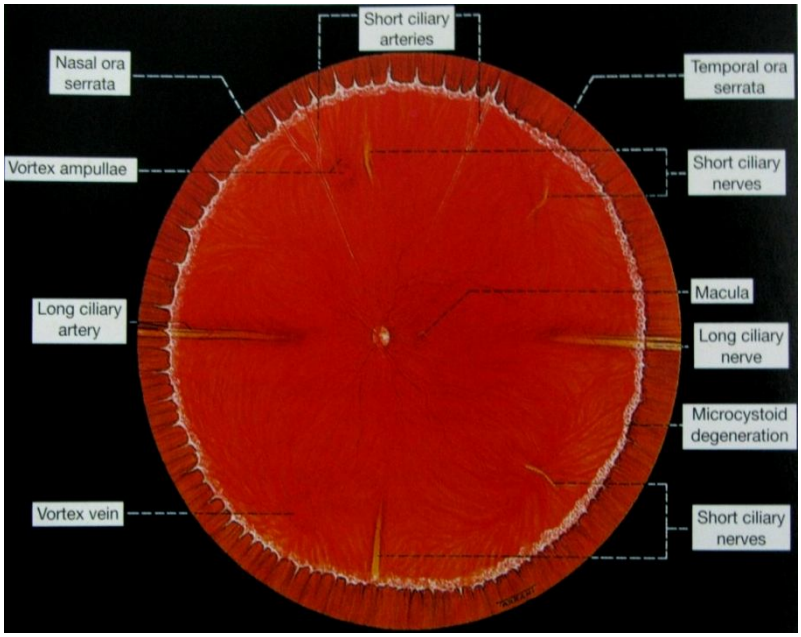
Surgical anatomy –from exterior

Taking limbus as a reference point from oraserrata to equator, it is 6-8 mmm & From equator to macula it is 18-20mm. The macula is 2.2mm

Vitreous base



Fundus landmarks



above and nasal to medial to inferior oblique insertion The sclera is thinnest at equator(0.5mm)& just posterior to muscle insertion(0.3mm).

VITREORETINAL ADHESIONS

NORMAL : Vitreous is an transparent ,colourless,jelly like mass occupying the posterior four-fifth of the globe and principally straddles to retina over an area of about 1.5mm in breadth at the ora serrata called the vitreous base.The areas of VR adhesions play significant role in the integrity of retina.

Normal VR adhesions

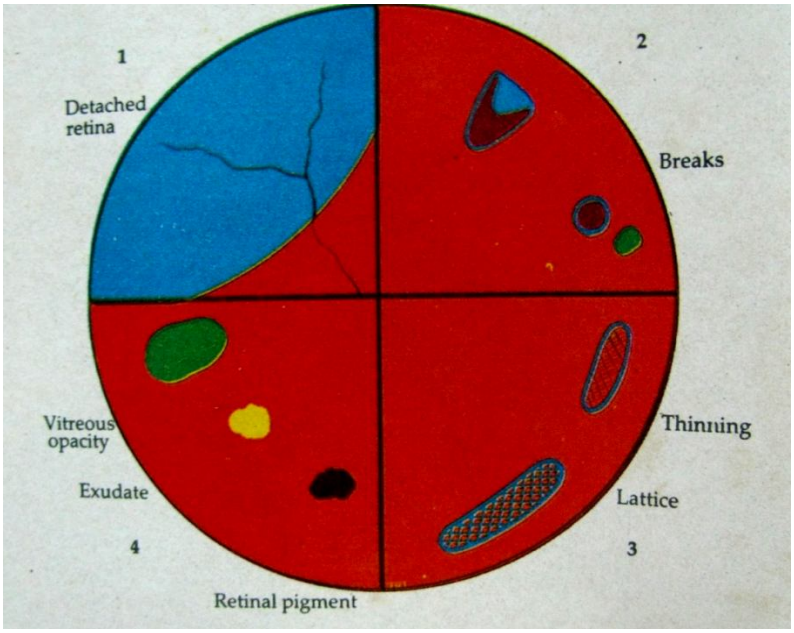
a. Around Vitreous base – very strong,b.Around Optic disc margin – fairly strong,c.Around fovea – fairly weak,d.Around Peripheral blood vessels – usually weak.

ABNORMAL

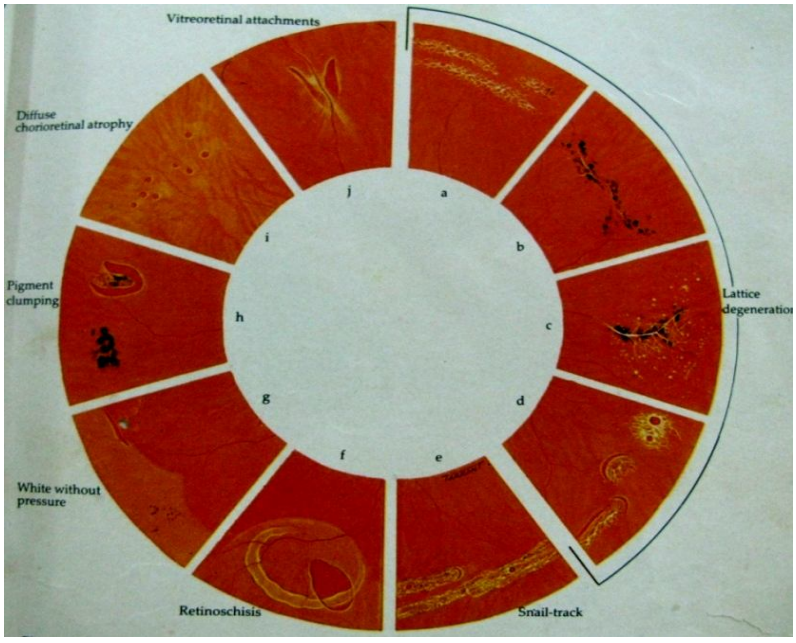
In Eyes with acute PVD,Occasionally the following abnormally strong vitreoretinal adhesions are associated with retinal tear formation .

1. Posterior border of lattice degeneration,snail tract degeneration.
2. Congential cystic retinal tufts

Standard colour code



Peripheral degeneration



3. Retinal pigment clumps
4. Peripheral blood vessels
5. Vitreous base anomalies – such as posterior tongue-like extensions and isolated islands
6. Areas of ‘white with pressure’ and ‘white without pressure

The Abnormal peripheral retinal degeneration are Classified as three broad categories

1.Degenerations with moderate to high risk risk RD

a.Lattice degeneration,,b.snail tract degeneration,c.Degenerative retinoschisis.

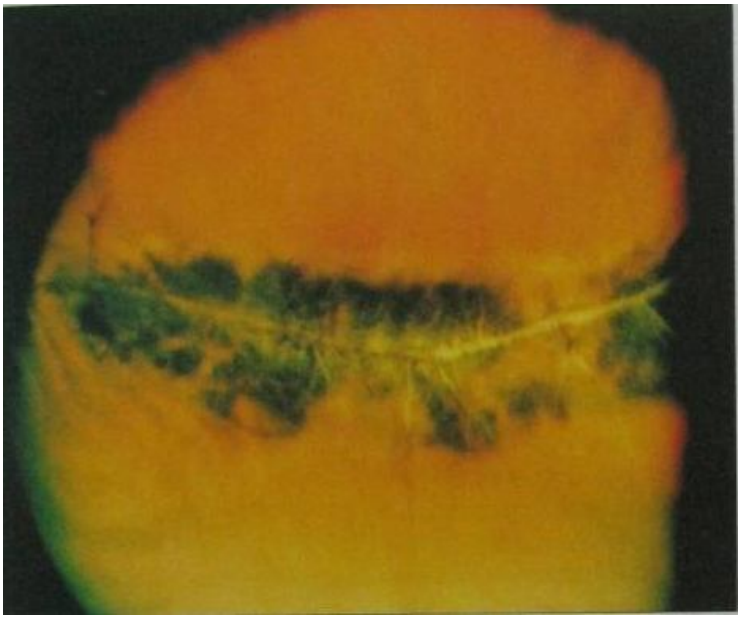
2.Degeneration with low risk of retinal detachment.

a.zonular traction tufts,congenital retinal tufts,Meridional folds,enclosed oral bays.

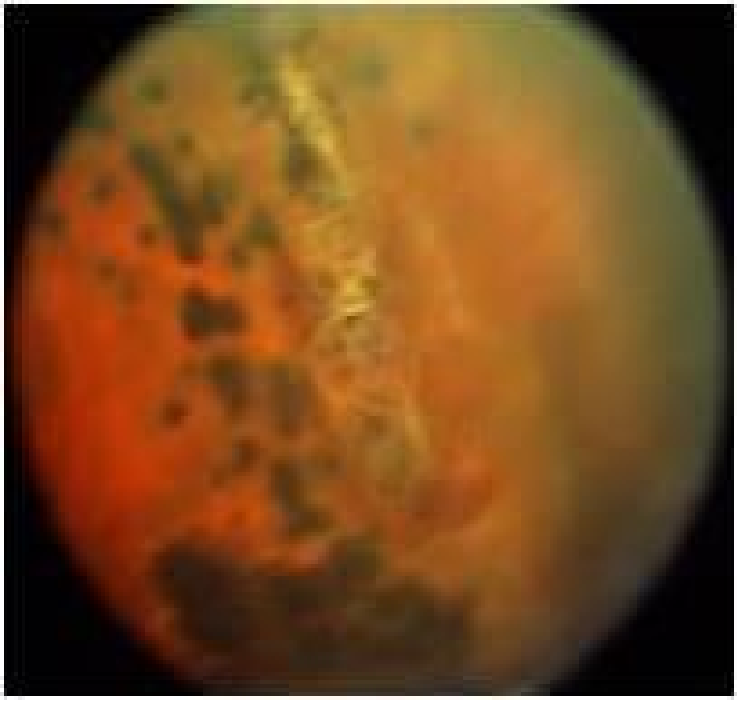
3.Benign degeneration with no risk of RD

Senile reticular pigmentary degeneration,paving stone degeneration,pars plana cysts.microcystoid degeneration,white with pressure & without pressure.

Lattice degeneration with pigment clumps



Snail track degeneration



THE DIFFERENT FUNDUS LANDMARKS:

VORTEX VEINS

There are about 4-6 vortex veins which are formed by whirling tributaries.They widen as ampulla , passing through the supra choroidal space, and enter their sclera canals.The inferior vortex veins are more anteriorly placed and hence more liable for damage ,in case of RD Surgery.

Surgical anatomy

From the equator ,the vortex veins emerge at varying distance at the sclera. Occlusion of these veins by tight encircling silicon band will cause congestion of the anterior segment.

LONG POSTERIOR CILIARY ARTERIES

The arteries usually accompanied by nerves are recognized as yellow lines that start behind the equator and they do run anteriorly in the 3 and 9 o'clock meridian.

Surgical anatomy

The arteries are in line with the horizontal recti in the suprachoroidal space.Since the arteries supply the anterior uvea, obstruction to the blood flow by a tight encircling silicon band may result in anterior segment ischaemia.

SHORT CILIARY NERVES

They usually appear as peripheral yellow lines.

NORMAL PHYSIOLOGY OF RETINAL APPOSITION

The Mechanical forces inside the subretinal space

- The various Adhesive forces created by the proteins, glycoproteins and proteoglycans in the interphotoreceptor matrix .
- Interdigitation with numerous microvilli of outer photoreceptors on the inner surface of RPE.
- Interdigitation of RPE by remodelling its apical segment by microtubules and microfilaments in correspondence with the photoreceptors.

The Mechanical forces outside the subretinal space

- The Oncotic pressure gradient across the subretinal space .
- The Hydraulic force created bythe IOP, tends to flatten the retina against RPE.
- Vitreous gel provides mechanical support as well as by preventing the fluid from enetering subretinal space.

Metabolic factors

- The RPE Pump acting as a active metabolic transport of fluid and ions .,therby contributing to retinal apposition.

The three prerequistes for the development of RRD

1. Tractional forces that produce retinal break

2. Liquification of the vitreous gel.

3. A Retinal break through which synitic vitreous gains access into the sub retinal space.

MORPHOLOGICAL CHANGES IN RETINA AFTER DETACHMENT

- Retraction of apical processes of microvilli of RPE.
- Migration and proliferation of RPE cells into subretinal space
- Degeneration and death of the outer segments of photoreceptor Hypertrophy of the Muller cells.

SRF SOURCE

1. Plasma from choriocapillaries across the RPE
2. Vitreous from fluid movement through the retinal break. This depends on the size of the break and state of vitreous gel overlying the break.
3. From different type of retinal degenerating elements

EFFECT ON IOP

RD is associated with hypotony because

1. Low grade iridocyclitis resulting in reduced aqueous humour formation .
2. Mis- directed aqueous flow. An intraocular shunt is created between aqueous humour secreted by the ciliary epithelium and fluid transported across the RPE.

INCIDENCE OF RD

1.Incidence of Rhegmatogenous retinal detachment affects approximately 1 in 10,000 of the population each year.

2.There is preponderance in Jews and is rare in Negroes.

3.Males Predominate females in the ratio of 3:1.This is attributed to the more incidence of trauma in males and other social factors.

4.Incidence increases rapidly at 20 yrs and much more rapidly again at 40 years attaining a maximum incidence between 50-60 yrs.

5. The second eye is usually involved within 5 YRS of the first .Bilaterality is 15-20% because of the degenerative changes in both eyes.

6.The predisposing causes of retinal or VR degeneration is transmitted than the detachment itself. .Family history of RD is a significant risk factor

Incidence ofRD in relation to cataract surgery

General-0.005-0.01%

Aphakia-1-3%

ICCE-1.74%,ECCE-0.62%

Pseudophakia-less than 1%

Phaco emulsification(uncomplicated)-0.1%

With YAG-3-5 Fold increase

With vitreous loss-40% increase

Incidence of RD in myopes.

Retinal breaks in Myopes-11%

Myopes with cataract surgery-9.6%

- 40% cases of Retinal detachment are High myopes
- 40% cases are associated with lattice degeneration
- 30% patients are aphakic
- 10% patients are associated with trauma
- 1-2% of uncomplicated post cataract patients develop RD. The risk is increased to7% if associated with vitreous loss.
- Postoperative patients comprise about 30% of RD

(Ophthalmology,Myron Yanoff et al.3(7.13)

PATHOGENESIS

Acute Rhegmatogenous PVD with collapse is the important predisposing factor of RD

PVD

↓

Synchysis Senilis

↓

Hole/break in thinned posterior vitreous cortex

↓

Synchitic vitreous enters the retrohyaloid space

↓

Posterior hyaloid detaches from the ILM

↓

Tears in Retina due to Dynamic and Static forces

↓

RRD

FORCES THAT CAUSE TRACTION ON THE RETINA

1. The gravitational forces on the vitreous gel attached to the retina
2. The dynamic forces transmitted from vitreous to the retina
3. Contraction of the vitreous gel at site of vitreoretinal attachment .
4. Contractile fibro cellular membrane on the surface of the retina posterior to proliferative vitreoretinal changes.

   In the pathogenesis of Rhegmatogenous retinal detachment two essential factors are the development of PVD and the Retinal

break.The complex sequence of events involved in the development of RD are schematically represented.

PREDISPOSING FACTORS IN PATHOGENESIS OF RETINAL DETACHMENT

Following are the various predisposing factors which alone(or) more commonly in various combinations can give rise to retinal detachment.

1.presence of posterior vitreous detachment.,2.High Myopia,3.History of ocular surgery.4.history of trauma,5.predisposing pheripheral retinal lesions.

AETIOLOGY:

Posterior vitreous detachment and retinal break are the prerequisites for a Rhegmatogenous retinal detachment to develop and the major aetiological factors responsible for these are the following

1.***DEGENERATIVE CHANGES***

The major pre-disposing degenerations are Lattice degeneration, Snailtrack degeneration, cystic retinal tufts, degenerative retinoschisis, focal pigmental clumping, Diffuse chorioretinal atrophy and strong vitreoretinal attachments.Lattice-like degeneration is seen in Marfans,Ehler-Danlos and Wagners disease all of which are associated with an increased incidence of RD.

2. ***MYOPIA***

Over 40% of all Retinal detachment occur in Myopes. Degree of myopia was directly related to RD which tends to be greatest between the limits of 8D and16 D&Axial length of26mm. In Myopia,the Max frequency is between 36-40years as against 40-60 years in all other types. The various factor that predisposes in myopia to RD are:

a.The Increased incidence of significant peripheral degeneration-lattice and snail track degeneration.

b.Early vitreous degeneration than other normal individual &PVD

c.The thin retina are being more prone for breaks in myope

d.The Interphotoreceptor matrix may be deficient in myope.

About 40% RD associated with High Myopia,increase in axial length ofby1mm,increases risk of RD by 1.3.

3. TRAUMA

The leading cause of RD in children and adolescents is the Blunt trauma. The Blunt trauma compresses the globe along its anteroposterior diameter and expands it in the equatorial plane.When the eye is rapidly compressed the underlyiny vitreous does not have sufficient time to stretch and as the resultant severe traction at the vitreous base,leading on to RD. This traction is usually strongest at the posterior border of the vitreous base and results in either linear tear Or dialysis. It can also cause irregular retinal break at the macula.

Penetrating injury is associated with RD and it presents(4 to 5 times),more commonly with vitreous hemorrhage. The site of penetration will produce a hole in the retina.Later the retinal break occur with contraction of fibrovascular tissue ,which proliferate into the intravitreal space at the site of penetration.The choroidal hole heals and seals faster,than the Break.

4. CATARACT SURGERY

The factors facilitating RD after cataract surgery are the following:

a.Vitreous moves slightiy forward exaggerating pre-existing VR traction resulting in RD in pre-existent breaks.

b.Traction on extreme periphery creating tiny breaks.

c. The depletion of Hyaluronic acid from vitreous allows collagen fibrils to aggregate and precipitate causing vitreousdegeneration and RD.

In a predisposed Eye,these changes are more significant.. The different Predisposing factors for RD in cataract surgery are:

- Vitreous loss that occurs during cataract surgery
- Any Pre existing lattice degeneration.
- TheAxial length > 24.5 mm in myopic patient.
- Nd – YAG capsulotomy –moreprone than normal individual.
- Post Operative trauma –any intraocular surgery.
- Early Posterior Vitreous Detachment
- H/O RD in fellow eye and family History of Retinal detachment.

The various factors that are responsible for RD after complicated

Cataract surgery are the following

a.Depletion of hyaluronic acid from vitreous results in aggregation of collagen fibrils thus precipitating PVD and RD

b. With preexistent breaks,Vitreous moves slightly forwards exaggerating vitreoretinal traction causing RD .

a. Associated Traction on extreme periphery which has tiny breaks

Aphakics differs from pseudophakics by having

- Multiple small oval holes.
- More nasal breaks than temporal
- More prone to total detachment because of faster spread of SRF (Schepens et al.,1992)

- **Significant features in pseudophakia**
- With in 1 yr of cataract surgery ,they are more prone for RD because they experience symptoms faster due to their good visual acuity.

- Single posterior tear is common
- Factors hindering poor visualization of fundus are inadequate pupil, ,IOL surface deposits,posterior capsule opacification and vitreous aggregation & opacities following inflammation.
- Usually present with macula off detachment.

- PCIOL is no disadvantage as far as anatomical attachment and functional visual results are concerned.
- The Anatomical reattachment is comparable to aphakics

(AK Gupta et al-Modern Ophthalmology)

5.YAG CAPSULOTOMY

The incidence of PCO is more,roughly 18-50% after cataract surgery of which, the relative rates of occurrence are:

Old age persons(ABOVE 70 YRS)10% within 5yrs,Adults-50% within 5 yrs.,Children-100% within 2yrs

Within 3 months of YAG capsulotomy procedure,about 47% to 59% of detachment tend to occur. YAG capsulotomy facilitates RD by

- Various Physiochemical changes in the vitreous leading to degeneration
- Shock waves generated post yag capsulotomy are detrimental
- The tamponade provided by Posterior capsule is lost.
- There is a possibility that Yag laser burn itself could produce a retinal tear.

Hence preferably, Yag capsulotomy should be delayed atleast 6 months after cataract surgery and should not be done unnecessarily.

RETINAL BREAKS

A retinal break is a through and through full thickness break in the neurosensory retina connecting the vitreous cavity to the potential space between the neurosensory retina and the RPE. The Breaks are classified according to pathology, morphology & location in the retina.

1.PATHOGENESIS

A.Tears -are due to vitreoretinal traction
–More predilection for upper temporalfundus due to gravitational force

B. Holes - are caused by chronic atrophy of neuro sensory retina
– More predilection for temporal fundus

2.*MORPHOLOGY*

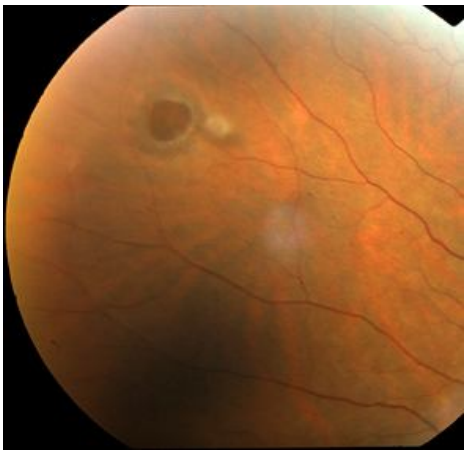
A. U tears (horseshoe,flap,arrowhead)

It has two anterior horns from the apex running forwards which is pulled anteriorly by the vitreous .The Base of the tear remains attached to the retina.

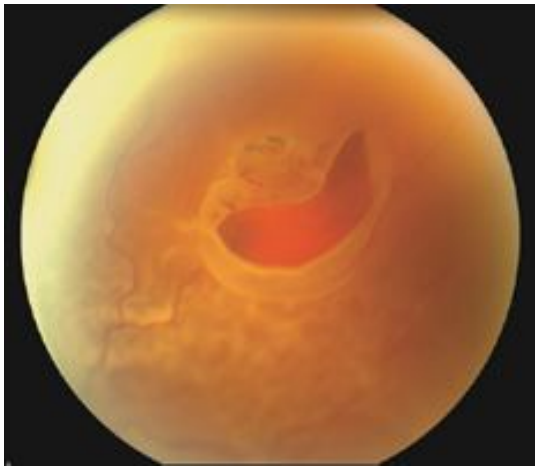
B. Incomplete U tear (linear,J shaped,L shaped)

C. Operculated tear –the above said flap are completely torn away from the retina .

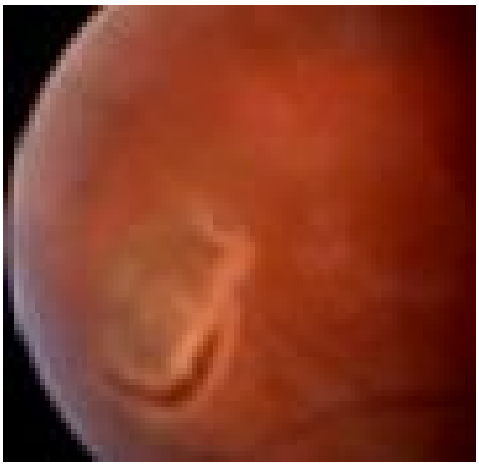
Round Hole



Horse shoe tear



Irregular tear



Dialysis

D. Dialyses - These are circumferential tears along the ora with vitreous gel being attached to the posterior margin of the break

E. Giant tears - Involves ≥ 90 degree of the globe circumference

3. According to LOCATION-the breaks are classified as

1. Oral 2. Postoral 3. Equatorial

4. Postequatorial 5. Macular

CLINICAL FEATURES

SYMPTOMS

1. **Flashes (Photopsia)**

   It occurs due toVR traction causing irritation of photoreceptors .

2. **Floaters (Muscae Volitantes)**

   They are moving vitreous opacities. It signifies the presence of tear.

   It present like a weiss ring, cobwebs or shower of small black spots.

3. **Field Defect**

   Often perceived as a “Black Curtain”due to spread of SRF,by the patient.

4. **Failing Vision**

   It is mainly due to obstruction of the visual axis by a large bullous RD hanging over the fovea or else due to spread of SRF Detaching the macula.

5. Inverse Diplopia

The margin of the tear rolls over and inverts itself in Giant retinal tear and dialysis causing inverse diplopia.The patient perceives a erect true image and inverted false image.

SIGNS

1. Visual acuity depends on the macula that may be detached or covered by a overhanging bullous RD
2. Visual field will have a relative scotoma corresponding to the detached retina.There will be sloping edges .
3. Red reflex appears grey and altered.
4. Marcus gunn pupil usually presents in extensive RD
5. Mild anterior iritis is a common finding.Posterior synechiae formation is very rare.
6. IOP is usually decreased by 5 mm of Hg.The causes for decreased IOP are due to excessive synchytic vitreous leaving the globe as SRF enters the potential space,drained by the RPE pump. RD with raised IOP occurs in Blunt trauma, tumour with RD, uveitis, obstruction of trabecular meshwork by inflammatory cells& pigment granules.

   (Schwartz syndrome)

7. Detached retina is seen as convex, corrugated, grey with undulating movements. Retinal vessels appear dark and tortuous. Retinal breaks appear as discontinuities in the retinal surface area.Breaks may be situated mainly in the periphery and mid periphery sometimes seen hidden between folds.
8. Pigment cells in the Anterior vitreous is strongly suggestive of a retinal break known as Tobacco dusting(shafer's sign)
9. Weiss' ring may be seen,as the mobile posterior border of PVD may be observed.

Signs of Old RD

1.Thinning and atrophy of retina seen in long standing Rhegmatogenous retinal detachment.

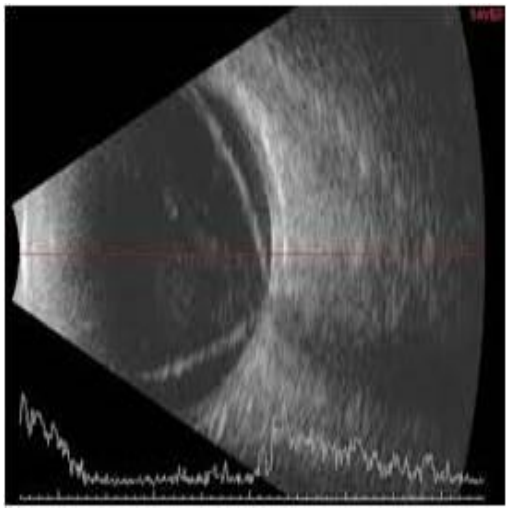
2.Sub retinal demarcation lines known as high water marks are initially pigmented and subsequently tend to loose their pigment.These marks usually represent, the junction of attached and detached retina and takes 3 months to develop.

2.Secondary intraretinal cyst formation takes one year to develop.

3.The progression of proliferative vitreoretinopathy is slow,that complicates the picture further.

High water marks

B Scan Rhegmatogenous Retinal Detachment

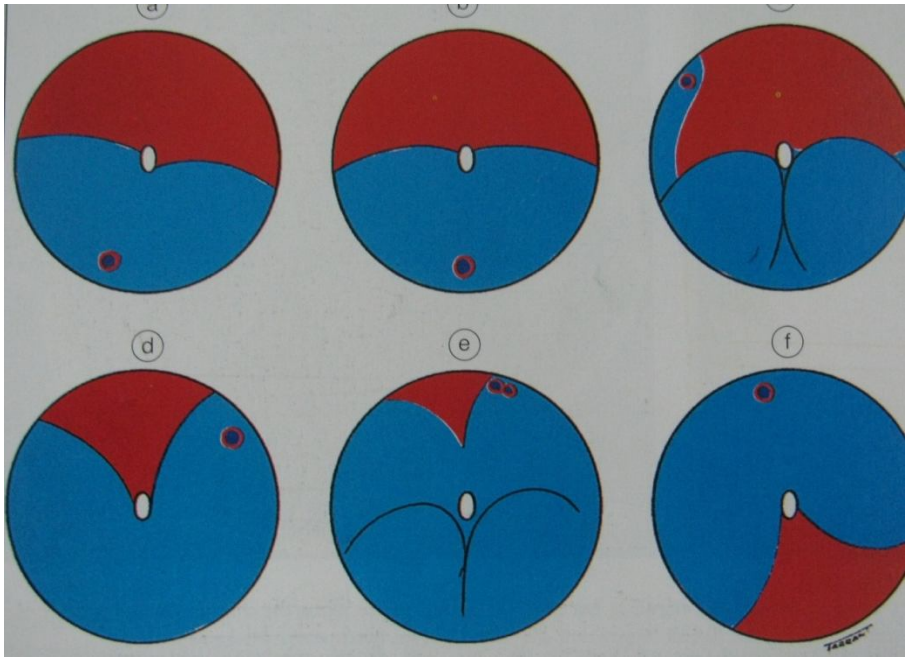


PROLIFERATIVE VITREORETINOPATHY (PVR)

In PVR,the cells proliferate on either or both the surface of the retina and on the vitreous strands and then contract producing stiffening and folds of the retinal surface. The membrane is derived from dedifferentiated RPE cells, fibroblasts, glial cells, macrophages and myofibroblasts. PVR has more predilection for the inferior retina.

Retina society classification of RD with PVR (1983)		
A	Minimal	Vitreous haze, Vitreous pigment clumps
B	Moderate	Wrinkling of inner surface, rolled edge of break, retinal stiffness, vessel tortuosity
C	Marked	Full thickness retinal fold C1 One Quadrant C2 Two Quadrant C3 Three Quadrant
D	Massive	Fixed retinal folds in four quadrants D1 Wide funnel D2 Narrow funnel D3 Closed funnel where ONH is hidden

Lincoff's rule



Proliferative vitreoretinopathy

Retina society classification of RD with PVR (1991)	
A	Vitreous Haze, clumps, pigment clusters in vitreous
B	Wrinkling of inner surface, stiffness, tortuosity, rolled edges and decreased vitreous mobility
C	1-12 clock hours, focal, diffuse, circumferential full thickness folds and subretinal strands CP-Posterior to equator CA-Anterior to equator

DIFFERENTIAL DIAGNOSIS

1. DEGENERATIVE RETINOSCHISIS

In this acquired variety, there are two forms

(a) Typical variety,where the division in the neurosensory retina is at the level of outer plexiform layer

(b) Reticular variety ,where the division is at nerve fibre layer.

Symptoms

- Photopsia and floaters are usually absent.

Signs

- The elevation of retina is convex, smooth,thin and immobile.
- Breaks may be present in one or both layers

The outer layer has beaten metal appearance while the inner layer has snowflakes and silver wire like vessels and shows

white with pressure.RD is a very rare complication because they never communicate with the subretinal space.

Congenital forms like Juvenile X linked retinoschisis, X linked recessive condition occurs, where the neurosensory retina is split at NFL.

2. *CHOROIDAL DETACHMENT*

The collection of fluid in the suprachoroidal space,detaches the choroid in continuum with the ciliary body.The vortex veins as they bridge through shall be a limiting factor, as is the sclera spur at its attachment to the ciliary body.

Symptoms

- Photopsia and floaters are usually absent.

Signs

- shallow AC and low IOP.
- Convex, brown, smooth and relatively immobile elevation of the retina which does not extend posterior to the equator

3. *SECONDARY RETINAL DETACHMENT*

a. EXUDATIVE RD

Retina appears Convex,smooth,non corrugated detached with not much mobility and with shifting SRF.

usually seen in tumours like choroidal tumours, Retinoblastoma,and in inflammatory condition such as posterior uveitis as in Harada's disease, Posterior Scleritis, Coats disease, Eales disease, Senile Exudative maculopathy, and also following cryopexy or diathermy

b. TRACTIONAL RD

Characterised by detached retina concave in appearance with the peak attached to the tractional band. Usually seen in PDR, ROP, PHPV, Sickle cell retinopathy, Toxocariasis , Parsplanitis and in penetrating ocular trauma.

C .UVEAL EFFUSION SYNDROME

It is a Rare idiopathic condition ,most frequently affecting middle aged hypermetropic men,characterised by ciliochoroidal detachment followed by exudative RD.It may be bilateral.It can be mistaken for a ring melanoma of the anterior choroid,or RD Complicated by CD.

Rhegmatogenous Retinal Detachment

Sub Total Retinal Detachment

Tractional RD

Exudative RD

MANAGEMENT

PREOPERATIVE

1. History with relavance to symptoms like flashes / floaters, myopic status, diabetic status, family H/o RD ,trauma is essential

2. Complete Anterior segment examination including phakic status, intactness of posterior capsule, tobacco dusting of anterior vitreous, fine Iris new vessels,and pupillary assessment is mandatory.
3. Recording of uncorrected visual acuity, visual field, IOP, refractive status of the eye should be done.
4. Detailed posterior segment examination by IDO With scleral depression along with diagrammatic representation in the fundus chart is the first and foremost objective in managing a RD case.

EXAMINATION OF THE FUNDUS

Direct Ophthalmoscopy

It is usually used for notingdown finer detail examination of posterior pole,as it gives 15 times magnification which is not possible with other modalities.

Indirect Ophthalmoscopy

The most ideal method IDO examination is under full mydriasis. The various advantages are Stereopsis, increased field of view and comfortable distance from the patient to draw the fundus diagram simultaneously. The scleral depression is essential to examine the ora serrata region & also to asses the nature of the retinal tear.It should be done after topical anaesthesia.. The sclera depressor should always be held tangential to the globe.

Slit Lamp Biomicroscopy

The ideal form for examination of the posterior pole using noncontact/contact lenses is the Slit lamp biomicroscopy with advantage of stereopsis.

TO LOCALISE A PRIMARY BREAK

Lincoff's rule is used to localise the quadrant of possible break according to the configuration of SRF.Indentation with sclera depressor is ideal to appreciate breaks in the periphery on profile.At times, in large bullous retinal detachment due to elevation,the break may be difficult to detect and sometimes when it is hidden between folds.

OTHER INVESTIGATIONAL TECHNIQUES

1. FUNDUS Photograph :

Performed for documentation and follow up.

2. B SCAN ULTRASONOGRAPHY :

The RD echo should be separated from the choroid by at least 1.5mm. Total RD has insertion at two sites namely ora serrata and disc. It gives 100% reflectivity with moderate after movement, while PVD shows freely mobile membranous echo of uneven thickness & reflectivity with variable attachment to ONH and retina with maximum undulating after movement.

PVR changes in Longstanding retinal detachment can be detected by B-scan.

Scan Mode	***RD***	***CD***	***PVD***
B scan	• Attached to ONH,nasal & temporal ora, • Restricted after movement which depends on duration of RD and PVR	• No Disc insertion. Thick dome shaped in periphery & does not extend beyond equator • Little after movement	• Freely mobile membranous echo of uneven thickness & reflectivity with variable attachment to ONH and Retina. • Maximum after movement
A scan	100% spike	Double peak or 'M' spikes	Low to medium spikes

3. ERG :

In RD it is subnormal or extinguished. But is a generalized response and small localized detachment may be missed.

4. Fundus Flourescein Angiography :

Has a role in Choroidal tumour or metastasis with Exudative RD.

BED REST

It is advocated

- To prevent macular involvement by SRF especially in cases of superotemporal retinal detachment
- To promote spontaneous resorption of SRF in fresh breaks
- To unroll the mobile posterior flap of GRT

SURGERY

"All holes have a detachment and All detachment have their holes"- was the dictum enunciated by Jules Gonin. The aim of RD surgery is to reattach the retina as quickly as possible by the most effective and least traumatic method with permanent closure of all retinal breaks.

Aim of RD Surgery

To see the hole

↓

Seal the hole

↓

SRF drainage

↓

Scleral buckling

A. SURGICAL EXPOSURE

360 degree conjunctival peritomy with horizontal relaxing incisions are necessary for adequate field exposure.

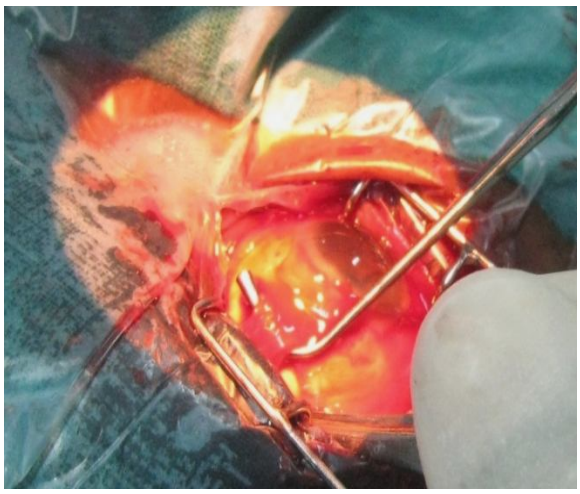
B. VISUALISATION AND MARKING OF THE BREAK

Eventhough a complete fundus diagram is available on the table every attempt should be made to reassess the detachment,nature of holes.

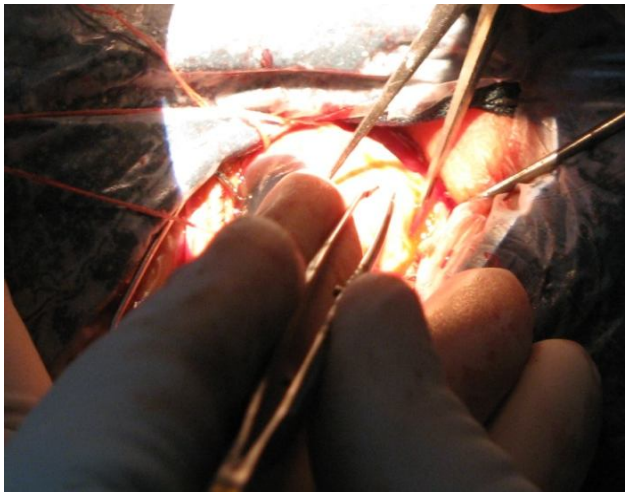
RD Surgery instruments

Reverse mounted needle

Taking bridle suture



Marking From limbus



By indenting the sclera with squint hook approximation of the retinal break to the RPE should be tried.

Protocol for marking the hole before applying cryo

- Atrophic round hole - Single posterior edge mark
- Small Flap tear - Single posterior edge mark
- Large flap tear - Each of two anterior horns and single posterior edge mark
- Multiple breaks close together - Most posterior break mark or posterior single edge mark
- Bullous RD - Parallax Occurs. So put first mark over the least elevated area
- Areas of prominent VR traction and lattice degeneration that to be supported by the scleral buckle also should be marked.

C. METHODS TO PRODUCE CHORIORETINAL ADHESION

1 .Photocoagulation: Laser can be applied through a slitlamp delivery system, Laser indirect ophthalmoscopy and Endolaser. Flat retina and clear media are prerequisites. It causes less breakdown of blood ocular barrier.

The lasers currently available are

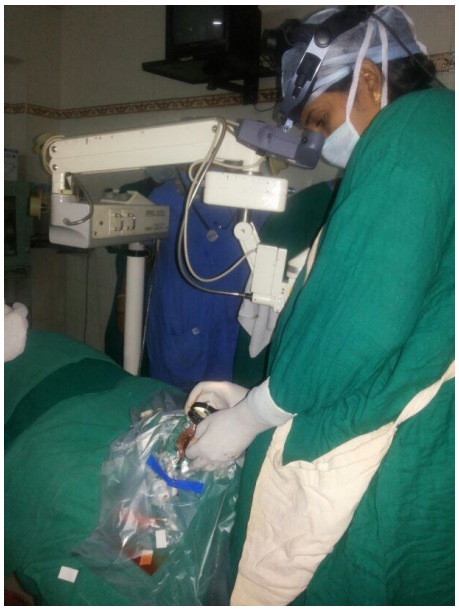
Gas lasers	***Solid State***
Argon	Ruby
Krypton	Nd YAG
Helium Neon	Tunable dye
CO_2	Diode

It is used in prophylactic treatment of breaks,following vitrectomy in the form of endolaser,in pneumatic retinopexy after the break is reattached,in treatment of macular hole.In the presence of SRF,Laser is not very useful because laser energy cannot reach through and produce CR adhesion.

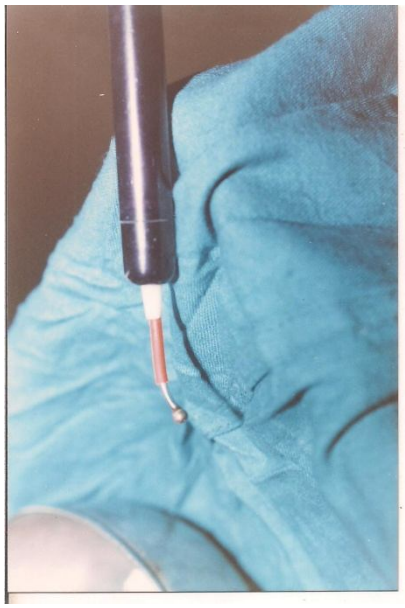
1. Cryopexy

High pressure Nitrous Oxide or CO_2 can be used. It works on principle of Joule Thomson effect. Retinal cryoprobe should reach temperature of -79˚ to -90C. Cryoprobe of diameter 2 to 2.5mm is used. End point of cryopexy is the retinal whitening. The aim is to surround 1-2 mm around the break.,whereas Small retinal break and atrophic holes are treated with single freeze centred on the break

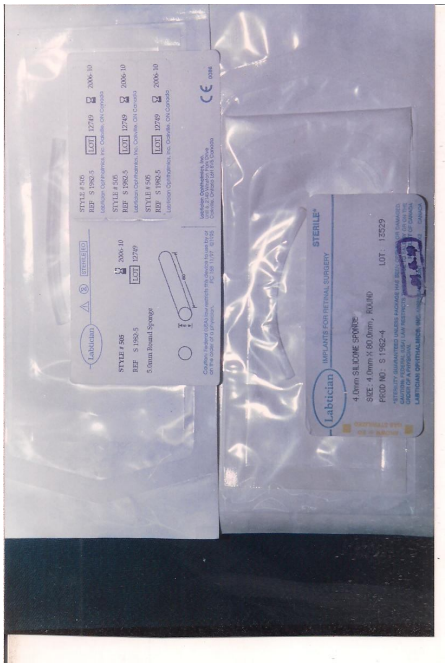
Noting Retinal Break With IDO



Cryoprobe



Silicon band and tyre



Silicon Band With sleeve

2.Diathermy

This procedure is nowadays obsolete . It Utilises 13.56 MHz high frequency alternate current to generate heat in the tissues due to electrical resistance.For diathermy, Uniform scleral dissection is necessary to produce a thin uniform bed. Applications are made in rows of 2 mm apart and parallel to the equator for 3-5 seconds duration. Diathermy burns leave 1mm mark.

Comparison between cryopexy and diathermy

Cryopexy	***Diathermy***
1. No evidence scleral shrinkage	1. Scleral shrinkage may occur
2 .It doesn't damage vessels. It Can be applied over staphyloma	2 If sclera thickness is nonuniform choroidal and retinal bleeding will occur
2. Even after accidental SRF drainage it can be applied even in wet sclera 3. Spots should be contiguous	3.Dry scleral surface is needed 4. spots need not be contiguous

Development of Chorioretinal adhesion

For photocoagulation – Effect usually starts in 24 hours & increases rapidly in 1week.

For diathermy and cryo - Effect takes several days to start.

- It attains maximum strength after 2weeks

D. METHODS TO PRODUCE RPE AND NEUROSENSORY RETINAL APPOSITION

The various methods available are:

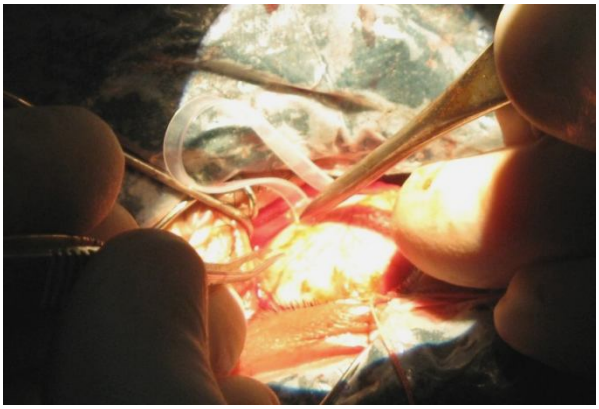
1. Scleral buckling
2. Pneumatic retinopexy
3. Vitrectomy with Internal tamponade
4. Combination of internal and external procedure

1. Scleral Buckling

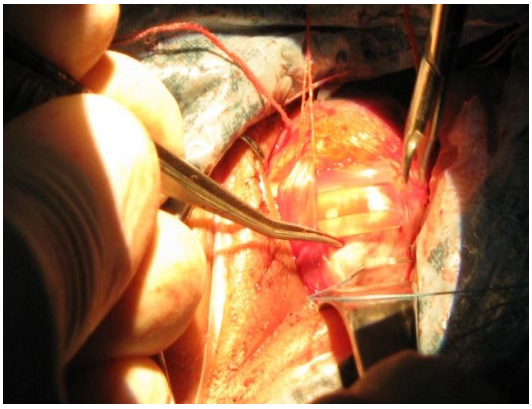
The advantages of this procedure are:

1) By this method of Scleral buckling,it relieves vitreoretinal traction due to effective reduction in the diameter of globe .
2) It causes functional closer of breaks by opposing them to the vitreous on inside and to the RPE on the outside.

Segmental Tyre Insertion



Encirclage in progress



SRF drainage

Watzke sleeve

3) It Creates a false ora serrata,that provides pseudoprotection against further hole formation and redetachment anterior to the buckle.

4) Holes that were not identified, will even be inadvertently sealed.

Materials used

Ideal buckling should be soft, non toxic, non allergenic, easy to mould, can be sterilized and cut to different shape.

Types of Buckle	
Non - absorbable	▪ Solid silicone rubber ▪ Silicone sponge ▪ Hydrogel
Absorbable	▪ Gelatin ▪ Biological- Donor Sclera, fascia lata, temporalis fascia, Achilles tendon, duramater ▪ Synthetic materials Polyglactin,Polydioxazone, Polyvinyl Teflon meshes, Arruga suture(supramid suture)

Silicon rubber : It is made up of cross linked dimethyl siloxane

Silicone sponge : It is made up of silicon rubber with air filled pores, but more compressible and elastic.

Buckle created is smooth, extensive and high .It can be round or oval in cross section.

Hydrogel : It has the advantage of both rubber and sponge. It is soft, elastic, microporous, smooth surfaced and it can be heat sterilized. Postoperatively it swells up and gives additional heightening of the buckle.

The mode of placement of buckle

Generally, the entire break should be surrounded by about 2mm of buckle. The buckle can be either implant or explant. Implant is the placed after thin sclera dissection with no exposure. Explants are placed over the sclera.

1.THE WIDTH OF A RADIAL BUCKLE-depends on the width (distance between ant.horns)of the retinal tear. Ideally ,width should be twice that of the tear.

2.THE LENGTH OF THE BUCKLE (DISTANCE BETWEEN THE BASE& APEX)of the tear.

3.HEIGHT OF THE BUCKLE-The greater the diameter of the explant,greater the separation of the sutures&tightness of the sutures-the higher the buckle.

The different nature of the explants can be

Radial	**Segmental Circumferential**	**360˚ encirclage**
Placed at right angle to the limbus	For dialyses and GRT	Breaks of 3 or more quadrants
Medium to large holes	Multiple breaks located in one or two quadrants	Lattice degeneration involving three or more quadrants
Horse shoe tear for supporting the tear in its long axis	Anterior breaks	Extensive retinal detachment without detectable breaks
Posterior breaks	May be 180˚ or 270˚	Milld PVR early
When there is risk of postoperative fish mouthing		Failed local procedure

In Aphakic and pseudophackic eyes with total RD and multiple holes encirclage is the treatment of choice.

Suturing methods:

Ideally,Mattress sutures with nonabsorbable materials such as polyester, nylon or polypropylene are placed a minimum 2mm further apart than the width of the sclera element. The vortex veins must be avoided in the suture. The suture is passed ½ to ¾ depth of sclera. Radial tyre should be placed in such a way that the posterior edge of the break lies on its posterior crest.

Encirclage ends are held together by Watzke's sleeve, Tantalum clips**,**Clove hitch nonabsorbable suture.knots are usually tied anteriorly but if a small buckle is being used, knot should be posterior for better cosmetic appearance.

E.MANAGEMENT OF SRF

The concept behind SRF drainage is to diminish intraocular volume so as to allow elevation of the buckle and to bring together the RPE and the neurosensory layer.

Indications for SRF drainage

- In situation such as BULLOUS RD,where there is difficulty in localisation of breaks
- Immobile retina

- Old retinal detachment , where the subretinal fluid is very viscous.
- Inferior equatorial tear
- Eyes with raised IOP.

The DACE (Drainage + Air + Cryo + Explant) technique favours early SRF drainage. Preplaced sutures have to be placed. Drainage is done through radial sclerotomy at the site of maximum detachment or usually just beneath horizontal recti avoiding the vessels. External drainage is done with 26 gauge needle attached to a syringe.The SRF is drained passively. Then inject air into vitreous cavity followed by cryo and external buckling. In Internal procedures subretinal fluid may be drained by retinotomy with endodiathermy or diode red/argon laser.

COMPLICATION OF SRF DRAINAGE

Choroidal haemorrhage,Iatrogenic break formation,Retinal incarceration,vitreous prolapsed ,damage to the posterior ciliary arteries and nerves,Endophthalmitis.

COMPLICATIONS OF SURGERY
IMMEDIATE COMPLICATIONS

A. Epithelial edema

Occurs due to raised IOP. The epithelium can be damaged by dessication ,during the procedure. Mild epithelial edema is usually treated with topical glycerine. Extensive edema requires debridement .

B. During diathermy

1. If the sclera surface is wet, diathermy is difficult to apply
2. Occlusion of the vessel can occur following accidental diathermy over a long posterior ciliary artery.

C. During Cryotherapy

1. Inadvertent freezing of the lids may occur
2. Premature removal of cryoprobe may result in choroidal haemorrhage and scleral rupture
3. Freezing over a prominent vessel running in the operculum can result in haemorrhage
4. Choroidal haemorrhage can occur if cryo is applied in the region of the vortex veins. Excessive cryotherapy by over-freezing or repeated freezing of the pigment epithelium leads into pigment dispersion. This is implicated in the causation of PVR

5. Intraocular penetration of sclera can occur through weak sclera.

D. Miosis

It may result from inflammation caused by excess cryo or hypotony caused by rapid drainage of subretinal fluid

E. During buckling and scleral suturing

1. Corneal clouding can occur
2. Accidental drainage of SRF can occur while taking scleral sutures
3. Damage to vortex veins can occur during placement of scleral sutures
4. While taking scieral sutures,Globe perforation rarely occurs .
5. During lamellar scleral dissection if the flap taken is thin, the mattress sutures holding the flaps over the implant may tear out of the flaps or the flap may tear from the sclera
6. Unintentional perforation of the scleral bed may occur.
7. CRAO can occur after prolonged elevation of IOP above the systolic pressure, following excessively tight scleral buckle .

F. Complication of SRF drainage

1. Dry tap results from failure to completely penetrate the choroid
2. Choroidal haemorrhage can occur at the time of perforation and release of SRF or after fluid has been drained. It is managed by

tightening of sutures over the buckle to increase IOP and prevent further bleeding.

3. Rapid evacuation of SRF is to be avoided,Since ocular hypotony can result in rupture of large choroidal vessel &miosis.

4.Iatrogenic break can occur due to accidental perforation of retina

5.Vitreous prolapse can occur when SRF is drained near large break at the site of flat retina.

6.Damage to long posterior ciliary arteries and nerves can occur if SRF drainage is done under the horizontal recti.

POST OPERATIVE COMPLICATIONS

EARLY COMPLICATIONS

1. Oedema of the periocular tissues *:*

Excessive cryotherapy causes, Oedema of the periocular tissues with pain and can also occur due to amount of tissue handling during surgery.

2. Persistent detachment :

The causes for persistent detachment are

(a) Missed breaks

(b) Unsealed retinal break due to improper cryo application and placement of buckle.

(c) Posterior breaks that are very difficult to reach by cryoprobe .

3. Anterior Segment ischemia :

This is caused by disinsertion of more than one muscle and also by poor perfusion of the anterior segment caused by tight narrow posterior encircling band .

4. Sterile Uveitis :

Due to either excessive cryopexy or due to excessive surgical trauma .

5. Vitritis :

Due to excess application or involving large areas of cryopexy.

6. Choroidal detachment :

It is caused by transudation of choroidal fluid into the suprachoroidal space. It usually occurs due to prolonged severe ocular hypotony following drainage of large volume of SRF and Usually it resolves spontaneously within 2 weeks.

7. Endopthalmitis

8. Secondary angle-closure glaucoma :

A tight encircling procedure can obstruct the vortex veins causing anterior rotation of the ciliary body in pre-existing shallow AC.

LATE COMPLICATIONS

1. Buckle extrusion and infection

2. Migration of the encircling strap

3. Recurrent Retinal detachment

Late failure is defined as initial attachment of retina and subsequent redetachment. The different causes are

(a) PVR (b) New break formation (c) Reopening of retinal break from inadequate chorioretinal reaction slippage of plomb, spontaneous extrusion of the buckle and removal of buckle due to infection or exposure.

4. Ocular motility disturbance :

This occurs especially if the rectus muscle has been disinserted or large explants have been placed under them.

5. Maculopathy :

Following surgery the macula may be damaged in a no. of ways

a) Cellophane maculopathy or macular pucker may occur

b) Cystoid macular edema is less common

c) Macular degeneration will occur with longstanding detachment

d) Pigmentary maculopathy resulting from excessive cryotherapy

e) Atrophic maculopathy is usually secondary to gravitation of blood in the subretinal space from intraoperative choroidal haemorrh

6. Extraocular muscle imbalance due to one of the following :

a. Insertion of a large plomb

b. Accidental disinsertion or rupture of rectus muscle

Excessive conjunctival scar

7. Refractive changes :

Segmental buckle produces astigmatism. Encircling bands produce mild myopia.

PNEUMATIC RETINOPEXY

It is an outpatient procedure. The main aim is to tamponade break by injecting a gas bubble into vitreous cavity combined with chorioretinal adhesion. It may be done either as a single session along with cryotherapy or as a double session in combination with photocoagulation.

- **Indications**
- Clear media
- Absence of PVR
- Breaks confined to superior 8 clock hours
- Breaks within 1-2 clock hours
- Cooperative patient

Contraindications

1. Proliferative vitreoretinopathy of Grade C and above

2. Patients in whom positioning is not possible

3. Inferior breaks

Expansile gases	***Non Expansile gases***
SF6 C_2F_6 (perfluoro ethane) C_3F_8 (perfluoro propane)	Air CO_2 Ag. Kr, Helium

Agent	***Dose***	***Expansion***	***Max Exp. (hrs) time***	***Half time (days)***	***Duration in weeks***
SF6	0.5 ml of 100%	x2	24-48 hrs	3-5	2 wks
C_2F_6	0.3 ml of 100%	x3.3	48-72 hrs	10-14	3 wks
C_3F_8	0.3 ml of 100%	x4	72-96 hrs	21-25	>4 wks

After Pneumatic retinopexy patient should be proper positioned, so that the break is uppermost atleast 16 hrs a day. No air travel is allowed as gas will expand.About 20-40% of routine primary Rhegmatogenous RD can be managed by this method.

Complications

a. Accidental damage to lens/retina

b.Haemorrhage may occur if damage to long ciliary arteries occur

c.Bacterial endophthalmis

d.Fish egg formation

e.Subretinal gas migration

TEMPORARY BALLOON BUCKLE

Inflatable balloon as a temporary buckle which is used to treat RD is a minimally invasive, office based procedure used in uncomplicated breaks or closely clustered breaks. A deflated balloon attached to catheter is inserted through conjunctival incision into the space along the sclera. The balloon is then inflated. It is combined with cryo or laser

PARSPLANA VITRECTOMY WITH INTERNAL TAMPONADE

Indications

1. Posterior breaks and Macular hole
2. Associated vitreous haemorrhage
3. Combined Rhegmatogenous and tractional detachment
4. RD with PVR grade C or more
5. Giant retinal tears
6. Dialyse

The instruments needed are

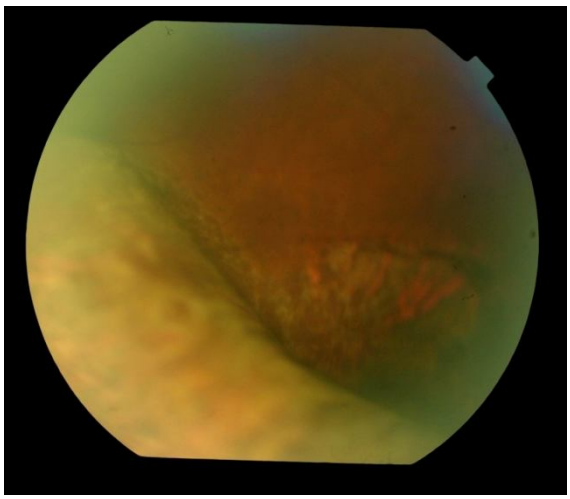
1) BIOM or corneal contact lens to aid viewing
2) Vitreous cutter
3) Endoillumination with 20 or 23 gauge fibre optic prob
4) Continuous infusion air pump system
5) Vitreous replacement substitute
6) Scleral plugs and forceps
7) Infusion cannula,
8) Vitreous cutter and back flush flute needle
9) Endolaser
10) Micro vitreoretinal blade
11) Membrane pics and hooked needles

PVR is tackled by peeling, segmentation or delamination.

INDICATIONS FOR PROPHYLACTIC THERAPY

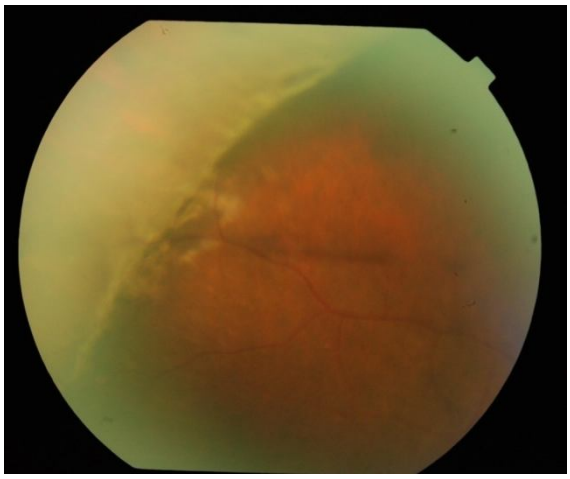
1. Fellow eye retinal detachment
2. Any break usually a flap with manifest traction on the edge in nonfellow phakic eye
3. Superotemporal breaks which might threaten the macula

Post RD surgery status- plomb effect due to encirclag

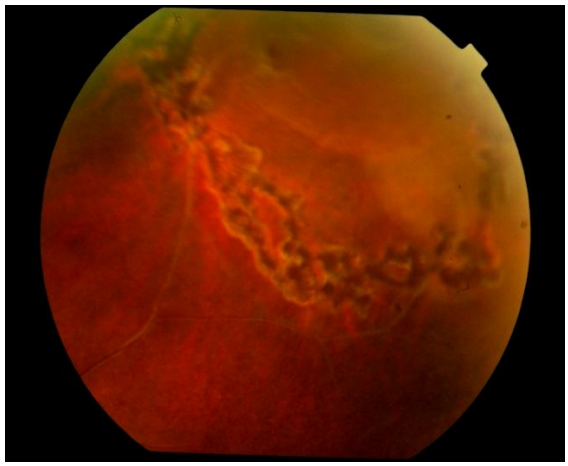


Barrage around the hole

Cryo marks with segmental plomb effect



Barrage Laser Marks



4. Widespread lattice particularly with multiple round holes encircling the retina along the equatorial line
5. Family history of retinal detachment
6. Symptomatic tear with flap in a nonfellow phakic eye
7. Subclinical RD- SRF extending more than 1 disc diameter on all sides that does not extend posterior to equator
8. Break in aphakia.

Anatomical and Visual results after scleral buckling

An overall reattachment rate of 80- 90% is achievable.The redetachment rate is 16.7%. In eyes with successful retinal reattachment of macula-off detachment, approximately 40% to 60% of eyes have final visual acuity of 20/50 or better. The extent and duration of preoperative macular detachment correlates with visual outcome.

75% of patients with macular detachment of less than 1wk duration attain 6/18 or better. Factors that might threaten the macula includeSuperotemporal breaks and Widespread lattice particularly with multiple round holes encircling the retina along the equatorial line

Giriad and Karpouzas found that macular detachment of more than seven days, decreased the chance of obtaining 20/50 or better postoperative visual acuity. As the duration of detachment increases beyond 2 weeks, cystoids spaces extend throughout the retina. Photoreceptor degeneration also occur, related to the duration of detachment.

Over the past five decades, the materials and techniques of scleral buckling surgery have undergone continued refinement. Although techniques like pneumatic retinopexy and primary vitrectomy also have been introduced, still scleral buckling remains the standard.

Failed Surgery

Occurs in 10-12% and the reasons are

(a) Failure to seal the breaks intraoperatively

(b) Retinal redetachment after a initial attachment due to new breaks or slipped buckle occur

(C) Proliferative vitreoretinopathy.

PART II

OBJECTIVES

PRIMARY OBJECTIVE

1. To evaluate the various etiological factors leading on to Rhegmatogenous Retinal Detachment
2. To study the different types of breaks , their quadrantic distribution and the extent of detachment in Rhegmatogenous Retinal Detachment.

3. To define abnormalities present in the fellow eye of the patients presenting with rhegmatogenous retinal detachment and their prophylactic treatment.

SECONDARY OBJECTIVE

1.To access the outcome after external scleral buckling procedure in terms of Anatomic attachment &Functional visual Recovery.

2.To analyse the cause of failure of primary external sclera buckling procedure.

MATERIALS AND METHODS

This study was carried out at Retina clinic, Regional Institute of Ophthalmology and Government Ophthalmic Hospital, Chennai during the period January-november 2013.

This study was prospective study in which patient presenting with primary Rhegmatogenous RD are registered and subjected to detailed evaluation ,primarily managed with External sclera buckling Procedure and followed up..

INCLUSION CRITERIA

1. A series of 30 patients with Primary Rhegmatogenous RD reporting to the hospital for the first time during the study period were evaluated..
2. Patient with Rhegmatogenous RD who were primarily managed with sclera buckling procedure using silicone explants were included in this study.

EXCLUSION CRITERIA

1. Patients with associated tractional RD&exudative RD..
2. Patient with detachment with severe PVR Changes(Grade C or D) needing internal procedure such as vitrectomy are excluded.

3. Patient who were unwilling to undergo surgery.
4. Patient re-detachment regardless of duration of attachment postoperatively,after surgery,were excluded from the study.

PROCEDURE

All patients with the above inclusion criteria were registered and evaluated. The history taking included

1. H/O defective vision,any flashing lights,floaters and visualising any peripheral visual field defect.

2 Previous H/O wearing spectacles for refractive error.

3. H/O of any sort of Trauma.

4.H/O of any cataract surgery in the past and h/o any complication met during cataract surgery.

5.H/O Of any laser photocoagulation /any other intra ocular surgery.

5.H/O of any posterior capsular opacification and H/O of any YAG capsulotomy and if so their duration after cataract suirgery were recorded.

6.H/O of any congenital anamolies like choroidal coloboma and systemic diseases like,Marfan syndrome ,Ehlers-Danlos syndrome and Stickler syndrome.

In all patient, Visual acuity was measured with Snellen's visual acuity chart. Pupils were dilated with cycloplegic and retinoscopy was routinely done and refractive status was evaluated. Detailed Anterior segment examination with a slit lamp Biomicroscope done.Any corneal, lenticular and vitreous opacities which hinder fundus visualization is noted .Marcus gunn pupil (Presence of any Relative afferent papillary defect) ,noted. In case of Pseudophakic patients ,status of posterior capsule, any posterior capsular opacification which hinders visualization of posterior segment, any evidence of Yag capsulotomy opening noted,any vitreous strands clogging to the wound noted. Signs of uveitis like cells ,flare and anypigment dispersion in the anterior vitreous were looked for.

By distant direct ophthalmoscopy, grey reflex was noted. Using binocular indirect ophthalmoscope with sclera depression,detailed posterior segment examination done in all patient.Type and extent of Retinal detachment at presentation noted.Macular on /off status noted at the time of presentation.Detailed examination of the fellow eye ,peripheral retina for any abnormal predisposing peripheral retinal degenerations noted using sclera indentation. . Three mirror examination was also done. Detailed fundus drawings of both eyes was done in all patients on standard fundus charts using the internationally accepted

colour coding.Fundus photography was done for documentation. of the retinal detachment.

In all Patients , rountine investigation like Random blood sugar,,urine analysis and Blood pressure measurement done.,X-ray chest&ECG done as aroutine investigation. B Scan USG was done. A scan done in all patient to note down the axial length in both eyes.Thorough, Systemic examination was done in all patients.and ,their blood pressure and blood sugar was brough,t under control,before planned procedure.

Strict bed rest was advised for all patients.It is more specific for patient with superotemporal involvement because the macula may detach by spread of SRF.Double padding of the eye is undertaken before surgery is contemplated.

ANAESTHESIA

Pupillary dilatation was carried out with Mydriatics & Cycloplegics like1%cyclopentolate and 1 0% phenylephrine in all patient 1 hr preoperatively. .pt were operated under local anaesthesia,Facial& Peribulbar blocks with lignocaine2%supplemented with 1% Bupivacaine. GA was used in paediatric cases and in anxiety patients.

SURGICAL PROCEDURE

The operative field and the fornices was prepared using 5% Povidone -iodine(Betadine).Both pupils should be dilated & while operating on one eye,the eyelids of the fellow eye taped shut to prevent accidental corneal exposure. Near the operating table, fundus drawing was routinely displayed .

360 degree ,conjuctival peritomy done& relaxing incisions made appropriate to the extent of sclera exposure required. . Episclera was cleared from sclera with cellulose sponge. Bridle sutures applied with reverse mounted needle with a 4/0 black silk to all 4 recti by passing underneath the muscle tendon, taking care to preserve the muscle sheath.Scleral inspection to detect any anomalous vortex veins and sclera thinning done.Exact localization and Confirmation of all the retinal breaks was done by indirect ophthalmoscopy with scleral depression and compared with retinal drawings.. Areas of tear were marked on sclera using cautery or with gentian violet marker pen.

If Encirclage is planned,then four partial thickess scleral tunnels were made after measuring the distance from the limbus,using caliper.,inbetween four recti muscle. Cryopexy according to the standard protocol was done for all retinal breaks viewing with IDO..Commence

freezing by depressing the footswitch& continue untill sensory retina has turned whiteFirst,.treat any predisposing lesions in the attached retina,,as this softens the globe and facilitate subsequent treatment of breaks in detached retina.while freezing, breaks,indent the sclera with cryoprobe to bring the RPE as close as possible to the break.Repeat cryotherapy until the entire break surrounded by 2mm margin .care must be taken to avoid freezing the same area , excess sclera indentation and premature removal of the cryoprobe.

For Encirclage,No. 40 Silicon encirclage band was placed underneath the 4 recti muscles and passed underneath the scleral tunnels.. Radial/segmental circumferential tyres were selected according to the size, site and type of retinal breaks. Segmental circumferential /Radial sponge(explants) was secured with 4-0 ethibond at appropriate sites.In general,the separation of sutures should be about 1.5 times the diameter of sponge explant.Check the position of the buckle in relation to the retinal break with the indirect ophthalmoscope.For very high buckle,space the sutures even further apart.. SRF drainage was done in the quadrant where maximum level of fluid was present. In most of the cases drainage was done inferior to horizontal recti,in the inferotemporal quadrant. Ends of encirclage band were tied with Watzke sleeve. The fundus was reexamined by IDO, to see height of the buckle, adequacy of

drainage, and the status of central retinal artery pulsation..Intraocular pressure was checked. Sutures were made permanent and conjunctiva was closed with 6-0 vicryl.

Examine the fellow eye carefully for any predisposing lesions with scleral indentation & if necessary ,prophylactically treat with cryotherapy or IDO Laser photocoagulation

Postoperatively all patients had pad and bandage for one day. Topical antibiotic and steroid drops were prescribed. Systemic antibiotics and antiinflammatory drugs were given for a week. Postoperatively anterior segment examination was done noting down any evidence of corneal edema, evidence of uveitis and pupillary reaction.Daily fundus examination done with indirect ophthalmoscope and progress noted.patient can be discharged after one week.

FOLLOW UP

Every patient was asked for a regular follow up every 1 week for for three visits in the first month . At each visit the status of the anterior segment, posterior segment and visual acuity was checked and recorded in all the patients. The other eye was also considered high risk and examined under full dilatation periodically.During the postoperative

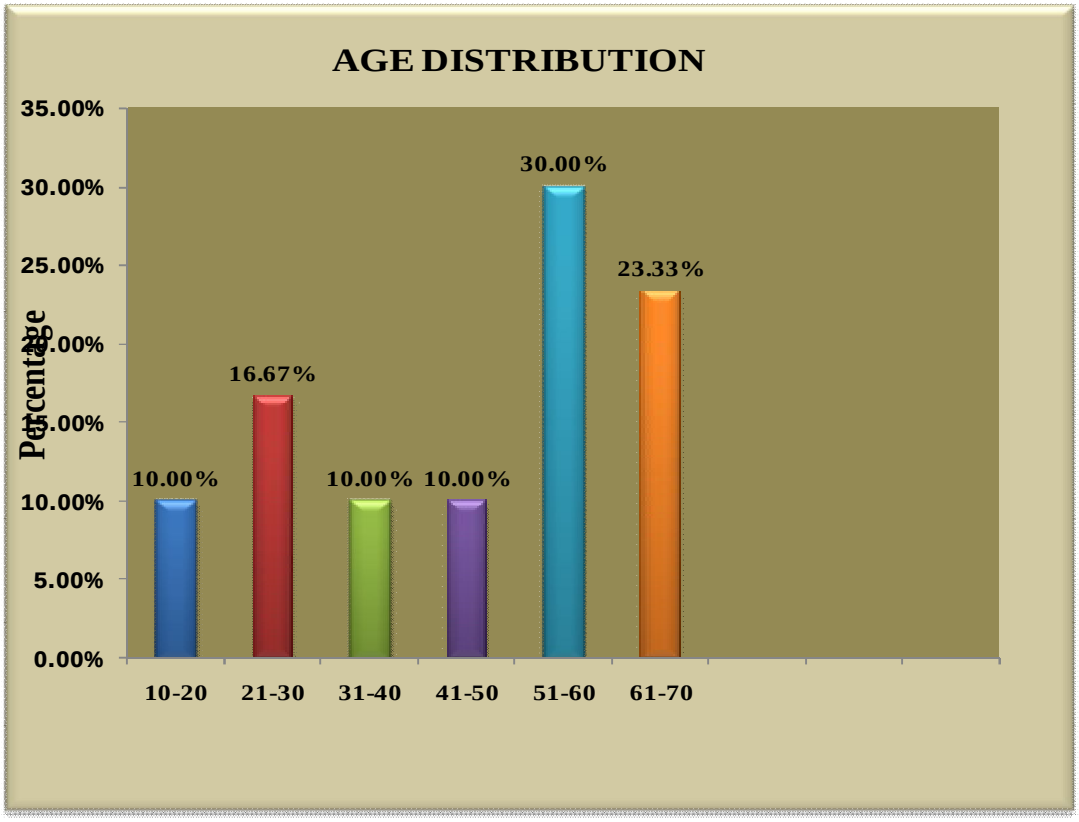
period and follow up, Prophylatic therapy was given in other eye if needed .

OBSERVATION AND INTERPRETATION

30 patients with Primary Rhegmatogenous RD who presented for the first time to our institute were enrolled into this study.

AGE DISTRIBUTION

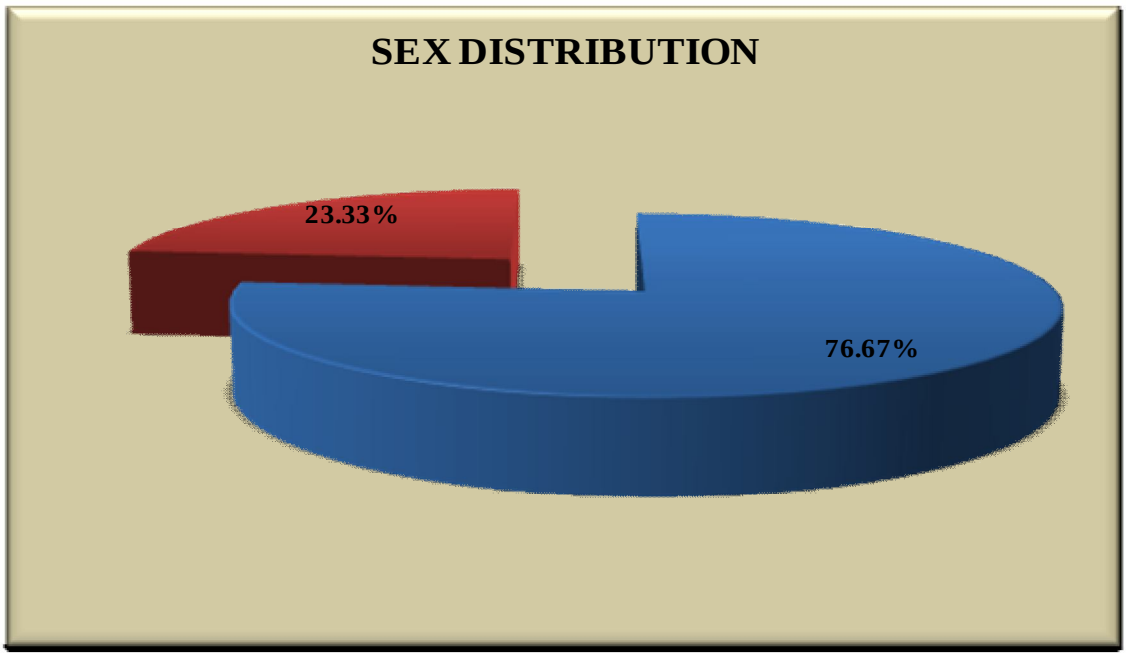
Age in Years	No. of Cases	Percentage
10-20	3	10.00
20-30	5	16.67
30-40	3	10.00
40-50	3	10.00
50-60	9	30.00
60-70	7	23.33
Total	30	100



The highest incidence was seen in 50-60 years(33.33%) age group. The youngest patient was 14years old and the oldest patient was 70years. The higher predeliction for the 50-60 yrs age group could be explained by the nature of target population with highest prevalence of cataract surgery with IOL Implantation during this age group period.

SEX DISTRIBUTION

Sex Distribution	No. of Cases	Percentage
Male	23	76.67
Female	7	23.33
Total	**30**	**100**

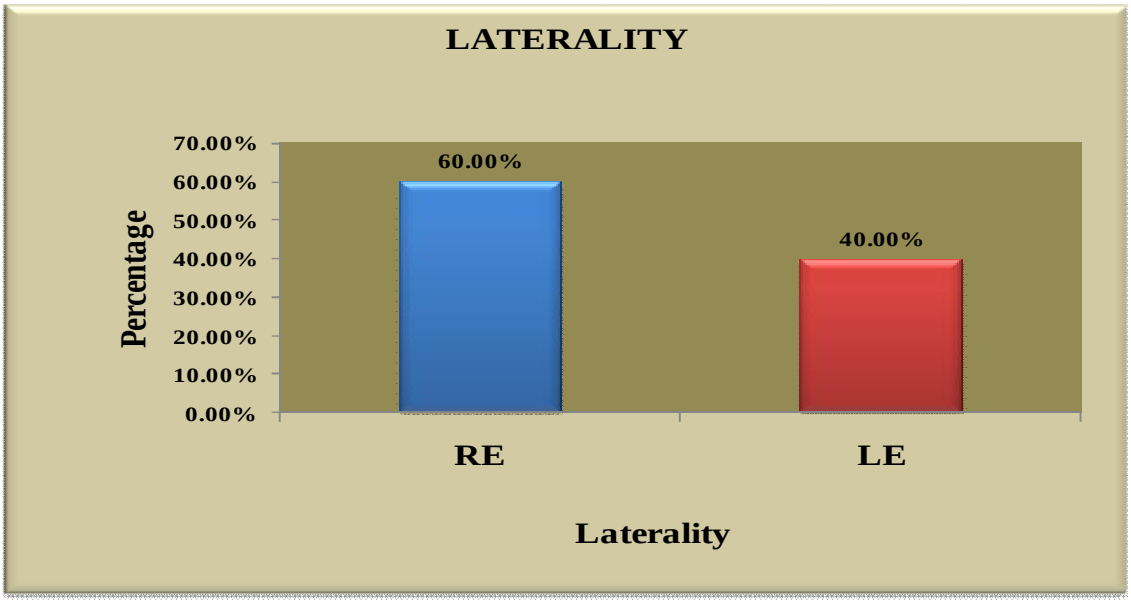


Males predominated our study23 cases(76.76%). The sex distribution was roughly 3 male patients to every 1 female patients.This correlates with the study of Polkinghore P.T.et al.,2004 who reported higher incidence of retinal detachment in males Increased incidence of

trauma and social factors are responsible for this male predominance.The higher incidence of RD Iin males was both due to the slight longer axial length in males and differences in basal vitreoretinal adhesions .

LATERALITY

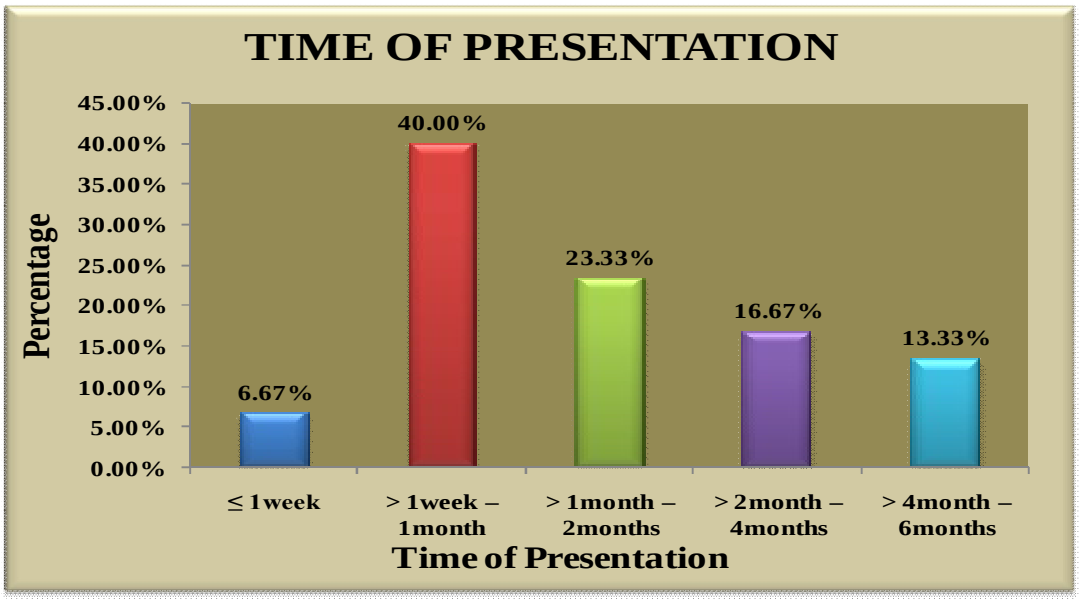
Laterality	No. of Cases	Percentage
RE	18	60.00
LE	12	40.00
Total	**30**	**100**



In our study,RE was involved in 18 cases(60.00%) ,compared to 12 cases(40.00%) in the LE.Two patients had long standing RD withGrade C PVR in the fellow eye.Both of the eyes was not operated.. There was no case report of Bilateral RD Occuring at the same period in our study

DURATION OF PRESENTATION

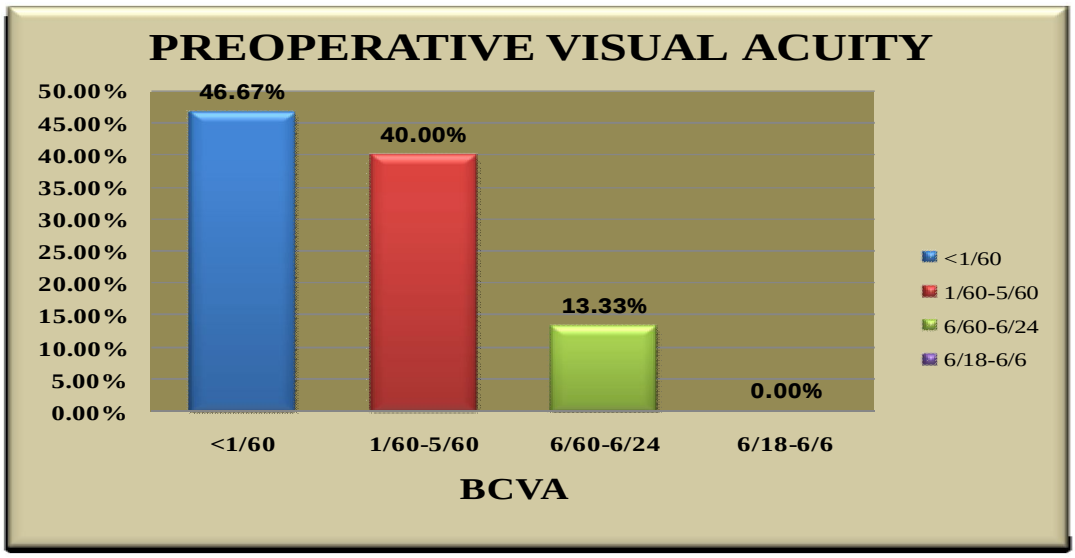
Duration of Presentation	No. of Cases	Percentage
≤ 1week	2	06.67
> 1week – 1month	12	40.00
> 1month – 2months	7	23.33
> 2month – 4months	5	16.67
> 4month – 6months	4	13.33
Total	**30**	**100**



Out of 30 patients only 2pt(6.67%) presented to our institute within 1week. 12 patients(40.00%) had defective vision of 1 month duration. 5 patients(16.67%) presented only after 2 months.4 pt (13.33%)had presented after 4 months.aphakes present later than pseudophakic eyes ,because pseudophakic pt present with good quality of vision after cataract surgery.

VISUAL ACUITY IN PREOPERATIVE CASES

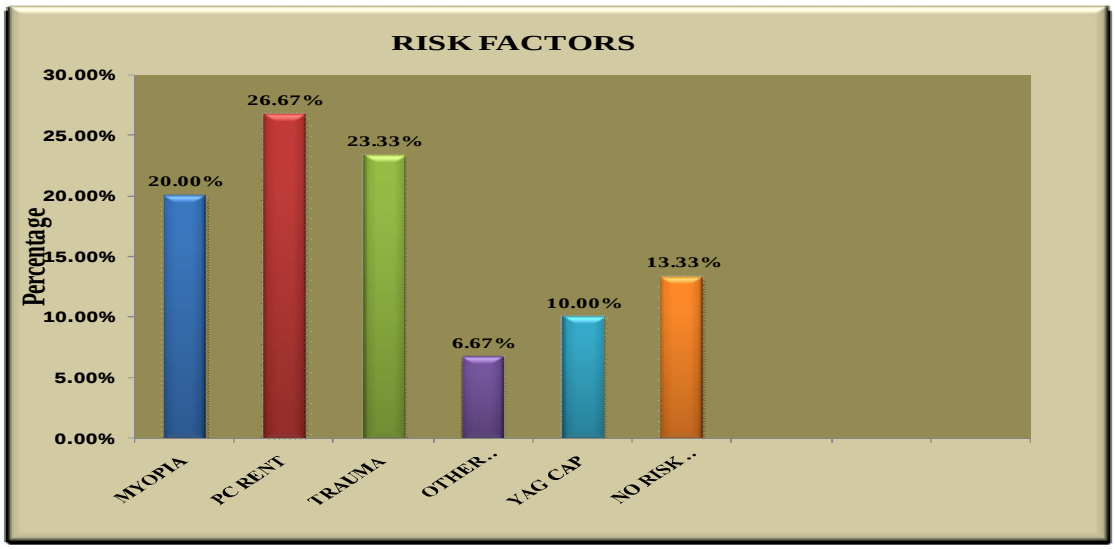
Preoperative BCVA	No. of Cases	Percentage
PL,CFCF,HM,1/2/60	14	46.67
1/60-5/60	12	40.00
6/60-6/24	4	13.33
6/18-6/6	0	0.00
Total	**30**	**100**



Preoperatively 14 cases (46.67%) presented with BCVA <1/60. 12 pt(40.00%) with VA<6/60 and 4patient(13.33%) with VA<6/24. In.majority of cases, macula was detached at the time of presentation and many patient reported late to the hospital.

RISK FACTORS

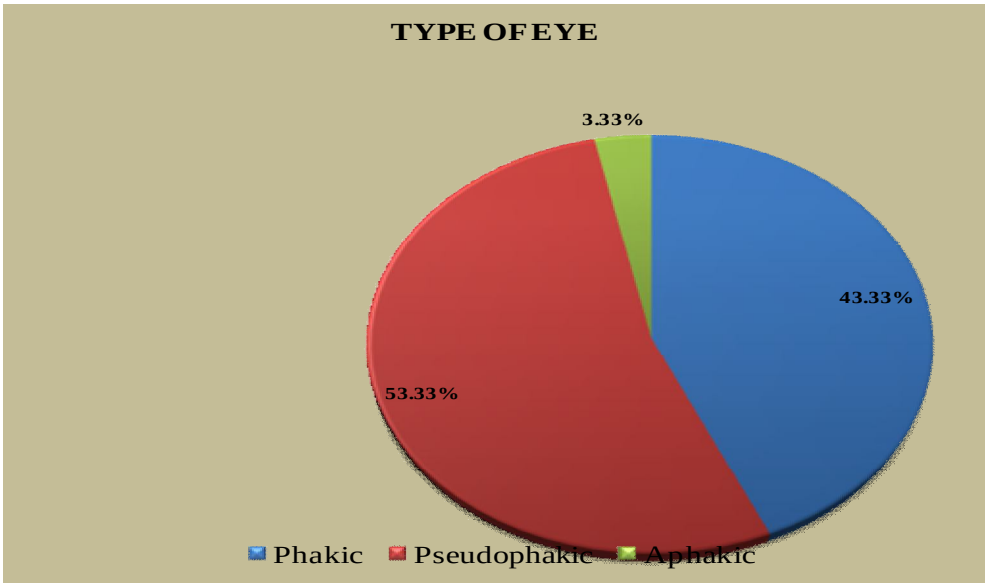
Risk factors	No. of Cases	Percentage
Myopia	7	23.33
PC rent	9	30.00
Trauma	5	16.66
Other eye RD	2	06.67
YAG Capsulotomy	3	10.00
No Risk factors	4	13.33



Among 30cases 7(23.33%) patients had myopia of which 3ptof them had high myopia with abnormal vitreoretinal adhesion in the fellow eye. 9 cases (30.00%) reported with PC Rupture followed by Trauma(5 cases (16.66%). RD Reporting after YAG capsulotomy was present in 3(10.00%) cases.Other eye RD was seen in 2patient(6.67%) . Suocava et al,in their study have reporyed the incidence of the major risk factors associoated with RD as PC rupture.In our study also PC Rupture constituted the major risk factor.

TYPE OF EYE

Type of Eye	No. of Cases	Percentage
Phakic	13	43.33
Pseudophakic	16	53.33
Aphakic	1	3.33
Total	**30**	**100**



Majority of cases 16 cases (53..33%) reported were pseudophakes. 13 cases (43.33%) of RD belong to Phakic group. Only 1case(3.33%) out of 30 patients was aphakic . The increased incidence in pseudophakic eyes is due to change in the trend and increase in the number of cataract surgeries being performed nowadays and that they recognize symptoms early and report early, because of good vision in these patients.

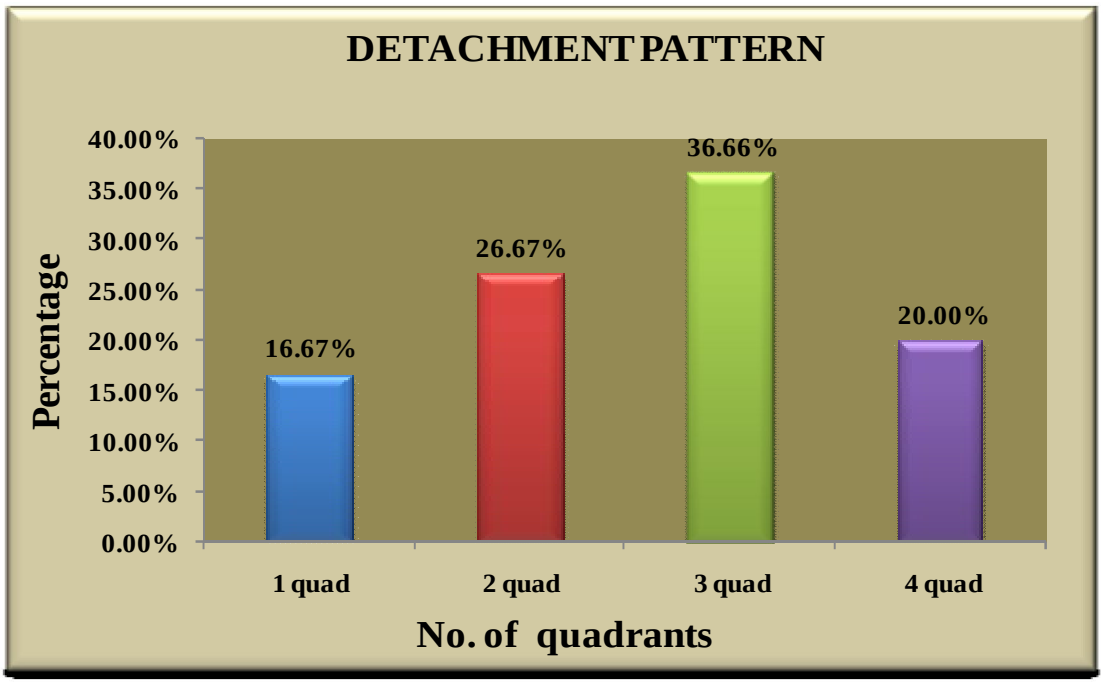
DURATION OF YAG CAPSULOTOMY AND RRD

Type of Eye	No. of Cases
<3 months	0
3-6 months	2
>6 months	1

Out of 3 patients who underwent YAG Capsulotomy, 2 patients have developed RD within 6 months Of YAG capsulotomy This correlates with the study by Mc person et al, stating that YAG Capsulotomy facilitates RD .Hence Yag Capsulotomy should delayed atleast 6 months after cataract surgery and should not be done unnecessarily.

DETACHMENT PATTERN

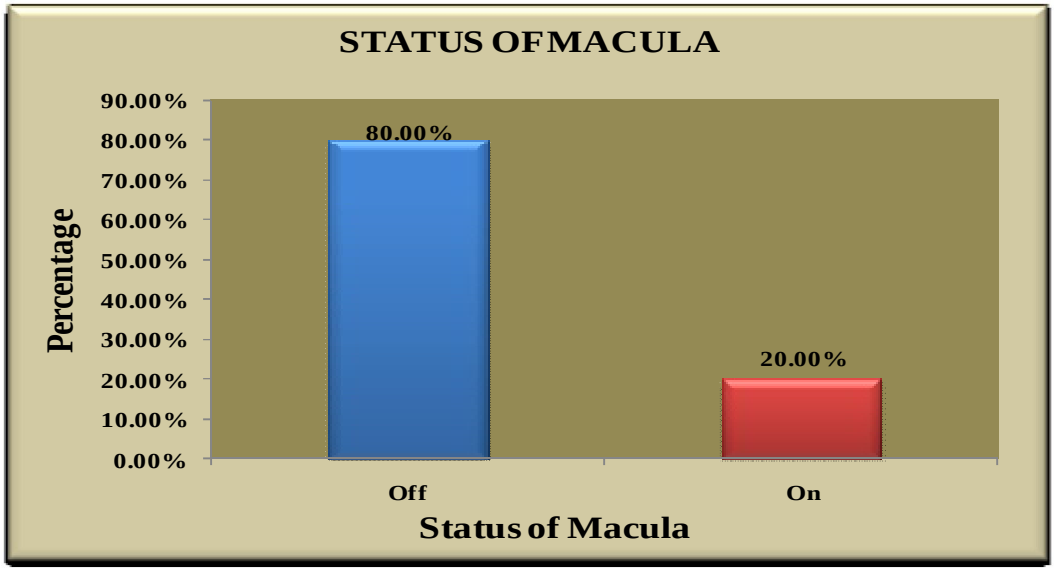
Detachment Pattern	**No. of Cases**	**Percentage**
1 quadrant	5	16.67
2 quadrants	8	26.67
3 quadrants	11	36.66
4 quadrants	6	20.00
Total	**30**	**100**



Total detachment was seen in 6 cases(20.00%) and subtotal detachment in 11cases(36.67%). Both together contribute to total incidence of 17cases(56.67%) since most of the patients reported later and eith macular off status.This compares with the series of Matri et al.,

STATUS OF MACULA

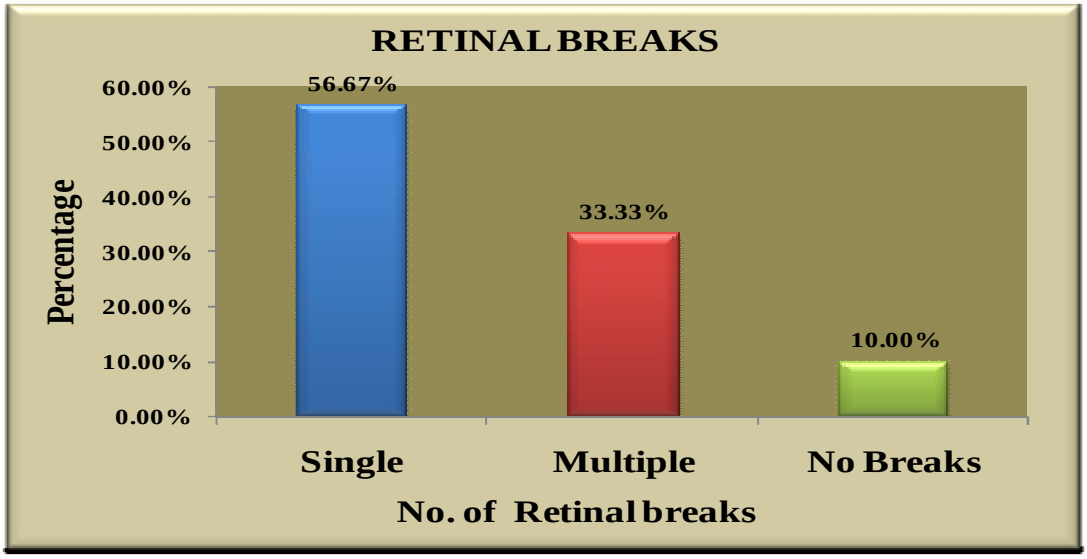
Status of Macula	No. of Cases	Percentage
Off	24	80
On	6	20
Total	**30**	**100**



24 Cases(80.00%) presented with macular off status. Only 6 cases (20.00%) presented with macula on status. Patients who presented late with macula off status, had poor functional visual outcome.Prognosis for postop visual acuity was better in those with macular on status.Early diagnosis & surgery within 10 days was the key factor in dealing with macular off cases to achieve good functional visual recovery(Hassan et al,ophthalmology 2002:109:146-152.)

NUMBER OF RETINAL BREAKS

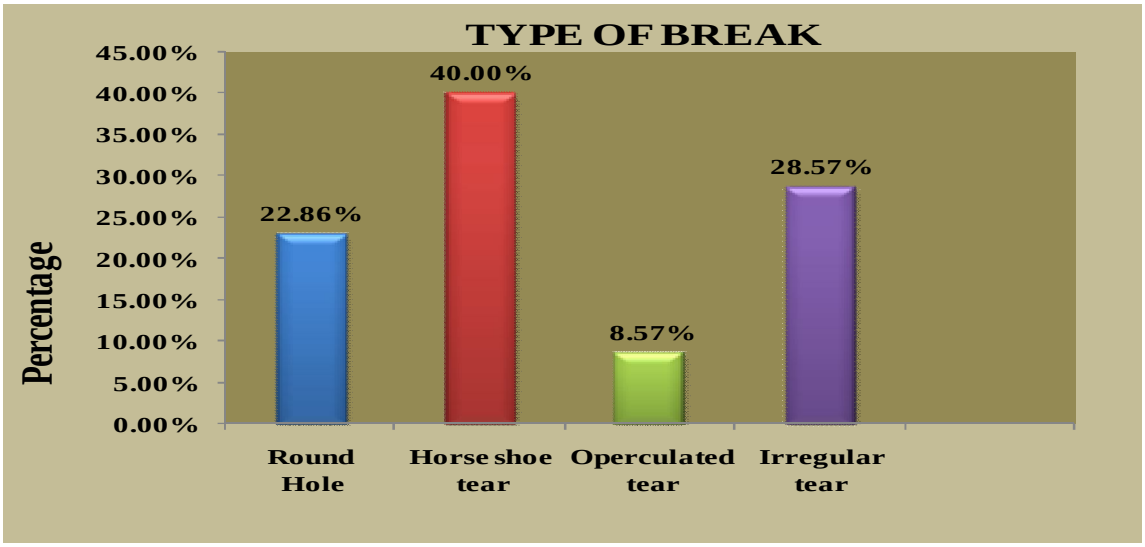
Number of Retinal breaks	No. of Cases	Percentage
Single	17	56.67
Multiple	10	33.33
No Breaks	3	10.00



Single break was seen in 16 cases (53.33%)Single posterior break is characteristic of pseudophakic RD and it compares well with the series of Schepens et al.. No breaks could be made out in 5 cases (16.67%) probably due to poor dilatation of the pupil in pseudophakic and aphakic eyes.Breaks was also not made out due to media opacity.Multiple break found in 10 cases(33.33%).Widefield indirect ophthalmoscope with Scleral depression on the table,during surgery facilitates better identification of breaks,was advocated by Newmann et al. In 50% of withRD have more than one break,and in most cases they are located within 90 degree of each other..

TYPES OF BREAK(35 BREAKS OUT OF 27 EYES)

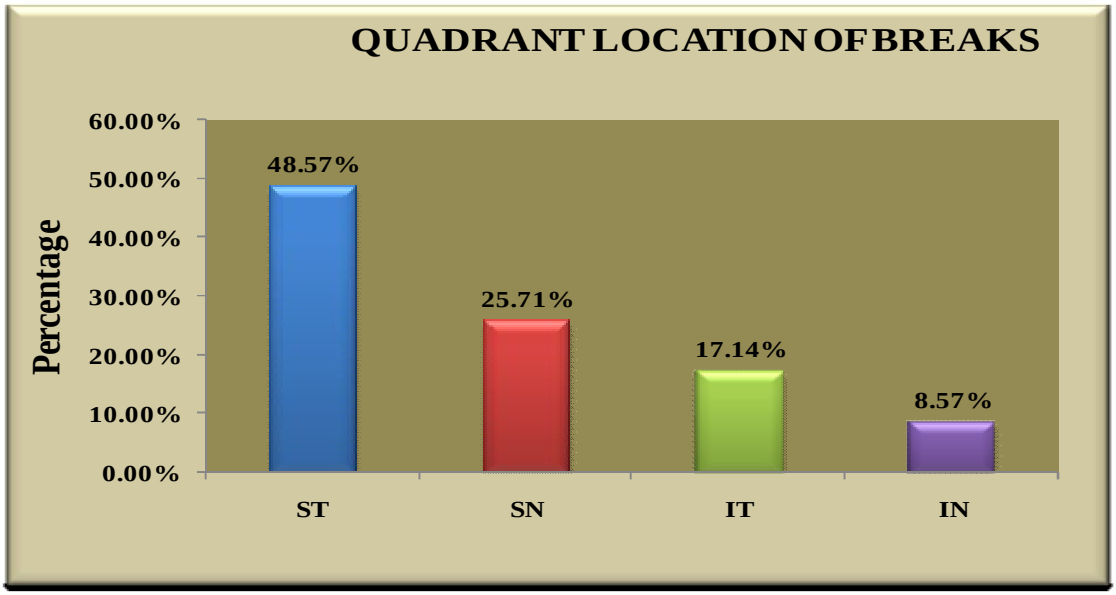
Types of Break	No. of Cases	Percentage
Round Hole	8	22.86
Horse shoe tear	14	40.00
Operculated tear	3	8.57
Irregular tear	10	28.57



Horse shoe tears were the commonest 14(40.00%) out of total 35 breaks followed by irregular tear 10(28.57%) out of 35 breaks.,followed by round hole 8(22.86%).Operculated tear seen in 3(8.57%)...Breaks due to dynamic VR traction predominated our series as might be expected in post cataract surgery eyes.Among the cases with multiple tears irregular tears was predominant.

QUADRANTIC LOCATION OF BREAKS

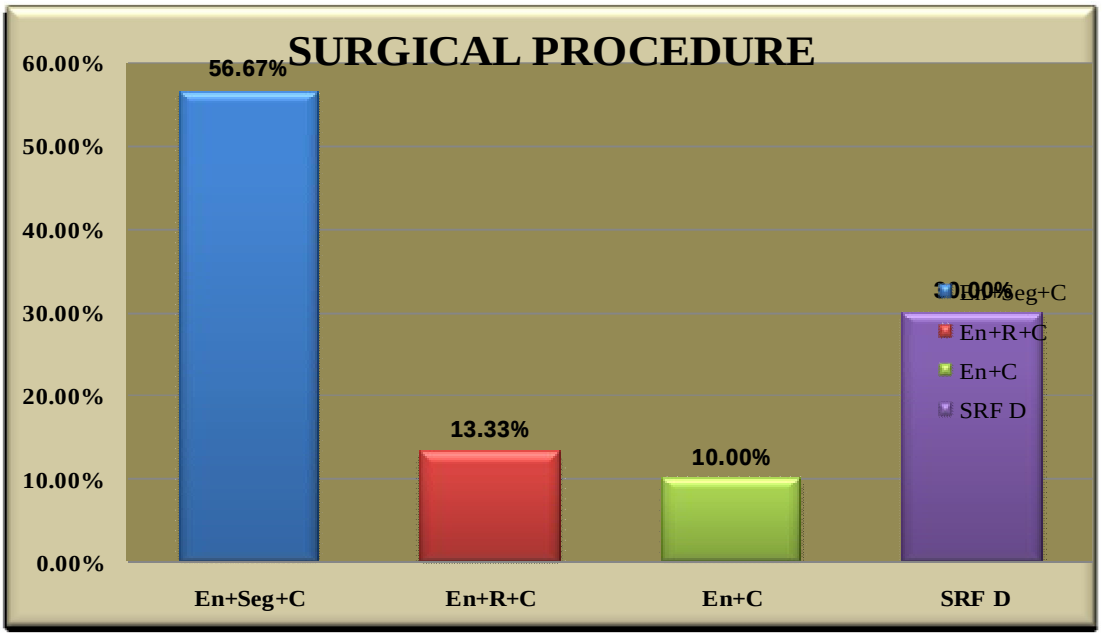
Quadrant Location	No. of Cases	Percentage
Superotemporal	17	48.57
superonasal	9	25.71
Inferotemporal	6	17.14
Inferonasal	3	8.57



Highest incidence of breaks was seen in ST quadrant for 13 cases (43.33%) in our study followed by SN quadrant in 6 cases (20.00%). Smolin et al has reported ST Quadrant for the commenest location of the break.upper temporal quadrant is the commonest site of retinal break and that ST quadrant should be thoroughly examined to look for break if not found initially.

TYPE OF SURGICAL PROCEDURE

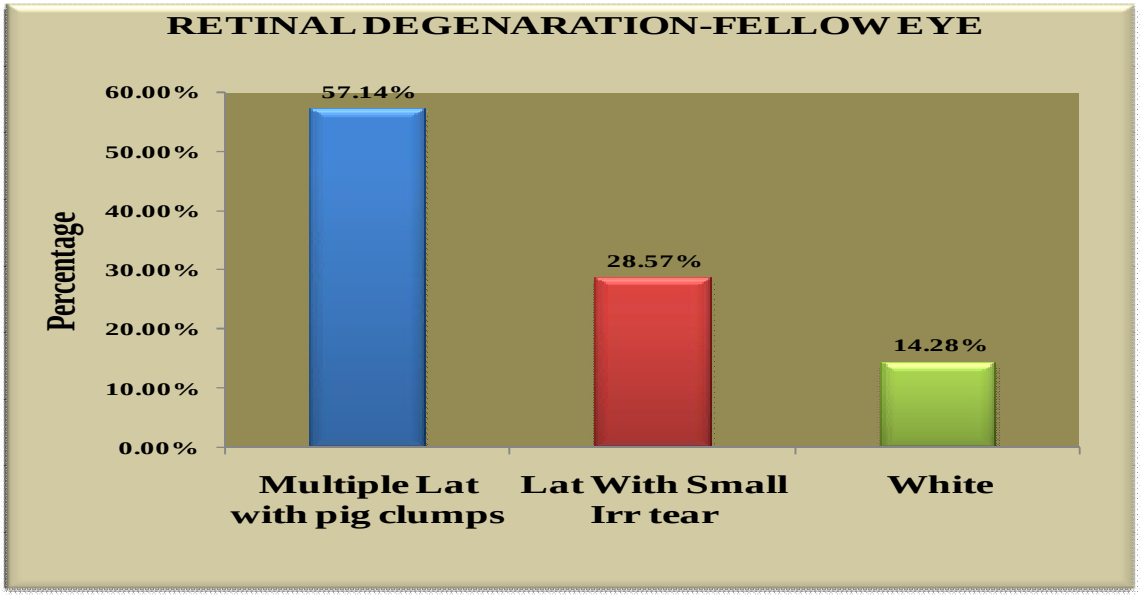
Surgical Procedure	No. of Cases	Percentage
Encirclage+Segmental+Cryo	17	56.67
Encirclage+Radial+Cryo	10	13.33
Encirclage+Cryo	3	10.00
SRF Drainage	9	30.00



Cryopexy with soft silicone buckle with SRF drainage was the normal procedure. Encirclage was done in 7 cases (26.67%) along with Radial buckle for cases having horse shoe tear..Circumferential segmental buckle with encirclage done in 20 pts (66.67%)according to the extent and location of the break. Cryopexy was done in all 30 patients. 9 cases

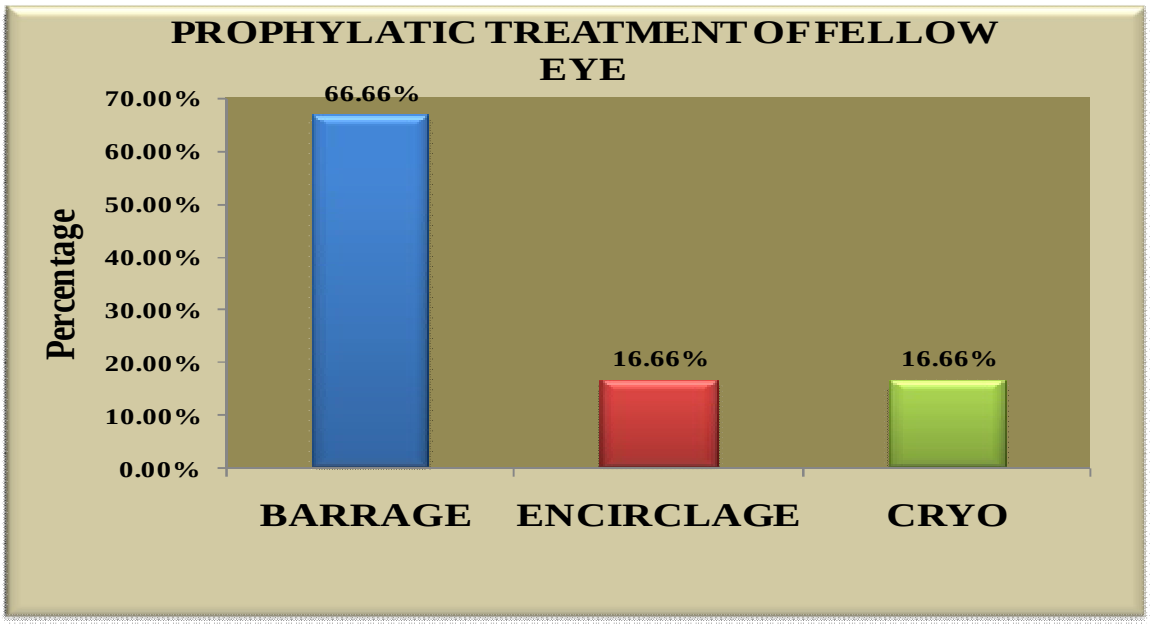
(30.00%) needed SRF drainage,Majority were subtotal and total RD and with more duration of presentation(>2months) .Total detachment was treated with encirclage.

Predisposing peripheral Retinal Degeneration Of Fellow Eye	**No.Of Cases**	**Percentage**
Lattice with pigmentary clumps and with small round hole	4	57.14
Multiple Lattice with small irregular tear	2	28.57
White without pressure near ora se	1	14.28



Among 7 pt who had abnormal vitreoretinal adhesions,4 patient had lattice with pigmentary clumps and with small round hole.2 patient had multiple lattice with small irregular tear.1pt reported with white without pressure near ora serrata.Among patient presented with lattice,3 patient were High Myope. .Bilaterality is 15-20% because of the degenerative changes in both eyes.The second eye is usually involved within 5 YRS of the first

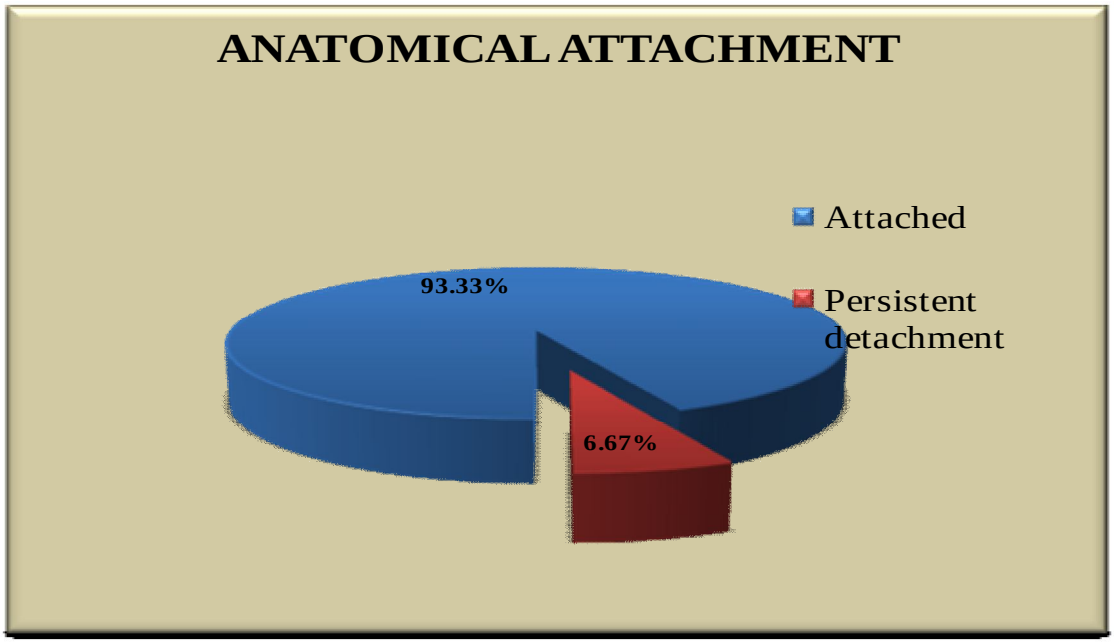
Prophylatic Treatment Of Fellow Eye	**No. of Cases**	**Percentage**
Barrage Laser	4	66.66
Encirclage	1	16.66
Cryopexy	1	16.66



Among 6 patient with lattice,4 pt(66.66%) underwent Barrage laser for lattice with pigmentary clumps and small round atropic hole.1 pt underwent prophylactic cryopexy for multiple lattice with irregular tear anterior to equator.1pt underwent Encirclage for multiple lattice in more than 2 quadrants.

ANATOMICAL REPOSITION

Anatomical REPOSITION	**No. of Cases**	**Percentage**
Attached	28	93.33
Detached	2	06.67
Total	**30**	**100**



Our Anatomical reattachment percentage was 93.33%.This compares with the series reported by Zivojnovic et al.which was 94.2%

Visual outcome according to duration at presentation

Duration	No. of Cases			
	<1/60	1/60-5/60	6/60-6/24	≥6/18
≤ 1week	0	0	0	2
> 1week – 1month	1	2	9	0
> 1month – 2months	1	2	4	0
> 2months – 4months	2	2	1	0
> 4months – 6months	2	2	0	0

2 patients(06.67%) presented within 1 week of RD had BCVA ≥ 6/18. But 2pt(06.67%) out of 5 patients who presented between 2-4 months had BCVA in the range of 1/60 – 5/60. ,2pt(06.67%) Presented <1/60,1 pt presented in the range of6/60-6/24.2 patient who presented >4 months had visual acuity <1/60.

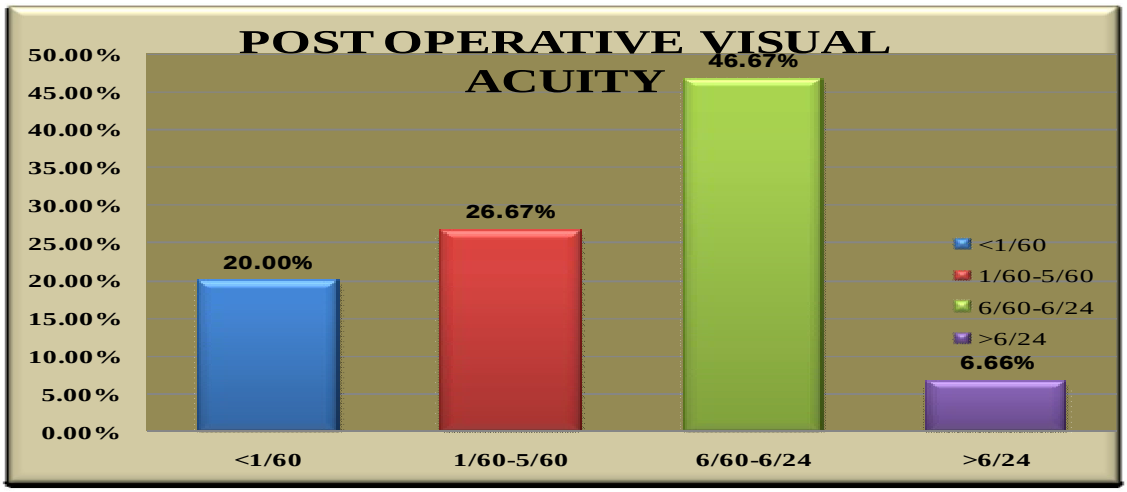
Cause Of Failure

Cause of failure	No of cases	Percentage
Not sealed break	1	3.33
Redetachment(new break)	1	3.33

Of the 2 cases that failed in our series one was a near total RD which failed because of not sealing of the break,probably it also had other breaks which were missed intraoperatively, due to poor visualization due to moderate PCO.The second case was a redetachment due to a new break within or nearby to treated area is due to heavy treatment of lattice

VISUAL ACUITY IN POSTOPERATIVE CASES

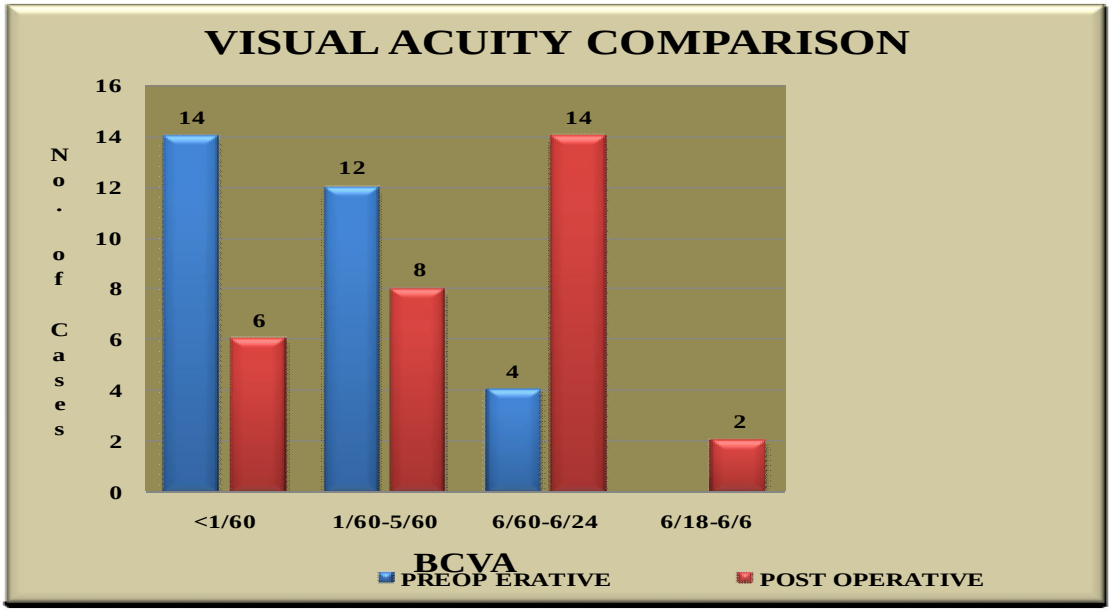
Postoperative Visual Acuity	No. of Cases	Percentage
<1/60	6	20.00
1/60-5/60	8	26.67
6/60-6/24	14	46.67
≥6/18	2	06.66
Total	**30**	**100**



Most of the patients 14 pt(46.67%) had BCVA in the range of 6/60 – 6/24. 6 cases(20.00%) had visual acuity<1/60.This has to be viewed against the high incidence of total/near total RD and macula off status in this series. Detached macula on initial examination and late reporting along with extent and height of retinal detachment account for the poor functional visual outcome.

COMPARISON OF PRE AND POSTOPERATIVE CASES

Visual Acuity	NoPreop of Cases	No Postop of Cases
<1/60	14	6
1/60-5/60	12	8
6/60-6/24	4	14
6/18-6/6	0	2
Total	**30**	**30**



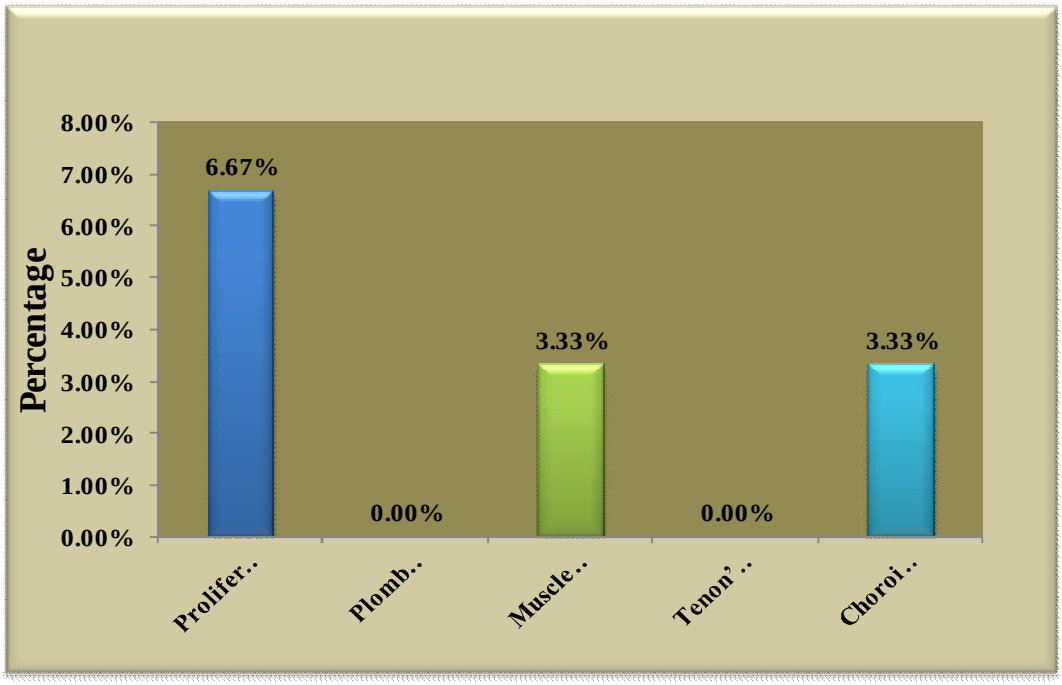
Preoperatively 14 (46.67%) out of 30 patients had BCVA<1/60.Postoperatively most of the patients (14 patients 46.67%) had improved to BCVA in the range of 6/60-6/24.Preoperatively 14(46.67%) had BCVA, 1/60, whereas. Postoperatively, only 6

patients(20%) had BCVA <1/60.Those patients who presented late& associated with macular detachment had poor visual prognosis.

POSTOPERATIVE COMPLICATIONS

Complications	No. of cases	Percentage
Proliferative vitreretinoopathy	2	06.67
Plomb exposure	0	0
Muscle imbalance	1	03.33
Tenon's cyst	1	03.33
Choroidal Haemorrhage	0	0

COMPLICATION



2 patients who had persistent RD developed PVR during follow up. . One patient developed tenon’s cyst and it was excised.1 patient muscle imbalance was reported, which subsequently improved during follow up.

DISCUSSION

The term retinal detachment is used to describe separation of neurosensory retina from retinal pigment epithelium. When the normal physiological forces that maintain the apposition between the RPE and neurosensory retina are overwhelmed, retinal detachment occurs.

In our case series of 30 patients who presented with primary RRD with duration of less than 6 months increased incidence was observed in 50 to 60 years age group. Phakic eyes had slightly increased incidence between 50 to 70 years whereas pseudophakics had more incidence between 40 to 60 years. Age related liquification of the vitreous and aggregation of collagen framework is responsible for PVD which subsequently led onto RD in this age group. Intraocular surgery accelerates the occurrence of PVD that correlates with earlier onset of RD in pseudophakics in our study group.This correlates with the age group in the study conducted by PolkinghorePJ et al(Clinical and Experimental Ophthalmol. 2004 Apr; 32 (2):159-63).

Male were predominantly affected in our study group. Both the longer axial length in males and posterior migration of the posterior border of the vitreous base in males may contribute to the higher

incidence of RRD in males.This was connoted by DannyMitry et al. (Graefe's archive for clinical and exp. ophthalmology, sept.2010).

Right Eye was more involved 18 cases(60.00%) ,than Left Eye 12cases(40.00%).

Phakic eyes 15pt (50.00%) had higher incidence whereas 14cases (46.67%) of RD were Pseudophakics. This relatively higher proportion of pseudophakic eyes in our study is due to the fact they recognize the symptoms early and also because of change in the type and increase in the number of cataract surgeries being performed nowadays.

A number of conditions exist that predispose to a PVD by prematurely accelerating the liquefaction of the vitreous gel. Among the total 30 patients,the various aetiological factors leading on to RD the increased incidence was among PC rent,found in 8 cases(20.00%) , myopes contribute 6 cases(20.00%) of RD. H/o trauma was present in 5 cases(16.66%) as a predisposing aetiological factor.. 2 patients had Rhegmatogenous detachment in the fellow eye.

Out of those 3 pt, who underwent YAG capsulotomy 2 patients developed RD within 6 months after the procedure. This

correlates with the study by Glacet-Bernard A et al, who observed that the average duration between YAG capsulotomy and RRD is 3.6 months(J Fr Ophthalmol. 1993;16(2):87-94.)

Most of them 17 cases (56.67%), presented with total detachment and subtotal detachment.24 pt(80.00%) had macula off status since most of the patients reported late. Macular on/off status along with duration of presenting detachment predicted the functional visual Recovery after successful External Scleral buckling procedure.

Single break was found in 17 cases(56.67%),whereas Multiple break was found in 10 cases(33.33%).Dynamic traction induced by eye movements and centripetal force exerted towards vitreous cavity plays an important role in the pathogenesis of retinal tear.Horse shoe tears due to dynamic vitreoretinal traction were the commonest (14 out of total 38 breaks) followed by irregular break (9 out of 38 breaks). Lattice degeneration with atrophic round or oval holes was observed in young myopic eyes.

Highest incidence of breaks was seen in superotemporal quadrant for 13 cases (43.33%) in our study followed by superonasal quadrant in 6cases(20.00%). This is in accordance with the results of

study conducted by Rosman M et al(Inter ophthal,Volume 24, Number 2, 2001,Page no.101-106(6)). Due to the effect of gravitational force exerted by the vitreous upon retina superotemporal quadrant is more commonly involved. No breaks made out was seen in 5 cases (16.67%) probably due to anterior location of the break and poor dilation of the pupil in pseudophakic and aphakic eyes& in Patient who had media opacity.

7patients had abnormal vitreoretinal adhesion in the fellow eye,out of which 4 pt had myopia.Most patient had multiple lattice with pigmentary clumps with small atropic round hole ,2 pt presented with Multiple lattice in more than 2 quadrant with small irregular tear& 1 pt with white withpressure near ora serrata.

We performed barrage laser for those who had peripheral lattice degeneration in the fellow eye. Prophylatic treatment of fellow eye include barrage laser for 4 pt,cryopexy for 1 patient,encirclage for 1 patient.

Preoperatively 6 cases (20.00%) presented with BCVA <1/60. Majority of them 12 pt(40.00%) had presenting detachment of 1 month duration. Only 2patients(6.67%) reported within 1 week . Most of them having macula off detachments 24 cases(80.00%). 9 patients presented only after 2 months-6months.

We performed Encirclage along with Radial or Segmental circumferential buckle according to the extent and location of the break . Aseptic chorioretinal adhesion was achieved by cryotherapy in all 30 patients. SRF drainage was needed in 9 cases (59.61%) .

Cryotherapy,Encirclage with SRF drainage was done in all cases of total or near total rd and also in cases where break was not made out.Presence of HST warranted a radial sponge for sealing,in addition to either segmental buckle or encirclage depending on the extent of detachment..

We achieved successful anatomical attachment in 28 cases (93.33%). This is in concordance with the anatomical success rate after buckling procedure by Ulrich Thelen et al (Ophthalmology Volume 117, Issue 4,Pages 785-790 (April 2010)) .We found Detachment in 2pts(6.67%). Failure was due to missed breaks and failure to seal the break intraoperatively, lead to persistent detachment in 1pt and the other was due to redetachment due to new break. and developed proliferative vitreoretinopathy in the follow up period.

Postoperatively 2pts(6.67%) had BCVA $\geq$ 6/18 & who presented within 1 week among 30 cases. 9 pts(81.81%) out of 11cases who presented between 1 week to 1 month had postoperative BCVA of

6/60-6/24 . Only 4pts(44.44%) out of 9 cases who had detachment for more than 2 months had BCVA <1/60..

Majority of the patients 14pts(46.67%) had BCVA in the range of 6/60 – 6/24..only 2 pt(6.67) had visual recovery >6/18. Detached macula on initial examination and late reporting of retinal detachment account for the poor functional outcome.

Complication encountered during follow up period include 2 patients developed PVR later during follow up, who had persistent RD after surgery .1 patient had Muscle imbalance which was subsequently removed. One patient developed Tenon's cyst and it was excised.

CONCLUSION AND RECOMMENDATION

In our study of 30 cases with Rhegmatogenous retinal detachment ,the maximum incidence of Rhegmatogenous retinal detachment was seen in the age group of 50-60 yrs.Majority of the cases were males and mostly had Right eye preponderance.patient reporting to our clinic with symptoms of RRD,mostly presented within 1 month of onset of symptoms.In our study,majority were pseudophakes having good quality of vision after cataract surgery

The major risk factor was posterior capsular rent followed by myopes.Proper intraoperative management of posterior capsular rupture with anterior vitrectomy and removal of any vitreous incarceration in wound with minimal traction is mandatory.Proper hydrodissection with continous curvilinear capsulorhexis with square truncated edged optic,within the bag IOL.Proper cortical clean up and polising of posterior capsule prevented the posterior capsule opacification.If YAG capsulotomy done within 6 months of cataract surgery increased risk of risk of Rhegmatogenous retinal detachment.

In our study,Total or Near total rhegmatogenous retinal detachment predominated.Superotemporal quadrant had the most number of breaks.HST predominated our study and that it was due to dynamic vitreoretinal traction.Majority presented with macular off

status.Encirclage with cryopexy was the sheet anchor in the surgical intervention in our case series.Although there was excellent anatomical reattachment,the functional visual recovery dependent on the various other factors like duration of retinal detachment at the time of presentation,status of macula(on and off) and pseudophakic eyes with PCO hindering visualization.

The cause of failure in our study was due to failure to seal all the break intraoperatively and another was due to redetachment with new break due to proliferative vitreoretinopathy in the follow up period.

Our study highlights that with modern cataract surgery techniques and with modern instrumentation if meticulously used greatly prevent the occurrence of PC rent .All Myopes ,pseudophakes and aphakes should be educated on symptoms of flashes and floaters and to report immediately when symptomatic.All pseudophakes with known risk factors should be called for periodic review for detailed fundus examination.

This study also emphasis the prophylactic treatment of abnormal vitreoretinal degeneration and those presenting with break in the superior quadrant within lattice at the earliest to prevent occurrence of RRD,especially in Myopes

This study emphasis the importance of screening patients with known risk factors and their proper recognition.Periodic detailed fundus examination and early detection plays a valuable tool in the management of Rhegmatogenous retinal detachment.

PART III

A CLINICAL STUDY OF

RHEGMATOGENOUS RETINAL DETACHMENT

PROFOMA CASE SHEET

NAME- **AGE -** **SEX -** **OCCUPATION**

IPNO- **DOA -** **DOD -**

CASE NO

PRESENTING COMPLAINTS

HISTORY **DURATION OF COMPLAINTS**

RE/LE

DEFECTIVE VISION

YES/NO

FLASHING LIGHTS

YES/NO

FLOATERS

YES/NO

VISUAL FIELD DEFECT(ANY BLACK CURTAIN)

YES/NO

OTHER COMPLAINTS

YES/NO

PAST HISTORY

H/O ANY SYSTEMIC DISEASES

YES/NO

H/O ANY TRAUMA

YES/NO

H/O WEARING SPECTACLES FOR REFRACTIVE

ERROR :MYOPE/HYPERMETROPE.

YES/NO

H/O ANY CATARACT SURGERY-

ANY INTRAOPERATIVE COMPLICATION

YES/NO

IMMEDIATE POSTOP VISUAL ACUITY

H/O PCO& YAG CAPSULOTOMY-IF YES WHEN

H/O ANY OTHER INTRAOCULAR SURGERY

YES/NO

H/O ANY LASER TREATMENT

YES/NO

FAMILY HISTORY-ANY OCULAR SYSTEMIC DISEASE

GENERAL EXAMINATION

OCULAR EXAMINATION RE

LE

EYE POSITION

EOM

ANTERIOR CHAMBER

PUPIL

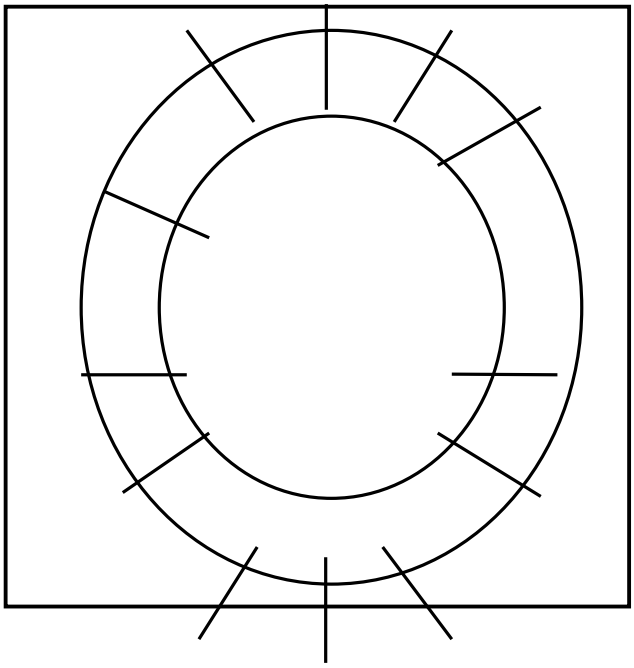
LENS INCLUDING IOL

STATUS OF POSTERIOR CAPSULE AND ANY OPACIFICATION

POSTERIOR SEGMENT:FUNDUS –DIRECT/INDIRECT

FUNDUS DIAGRAM

EYE



DESCRIPTION OF RETINAL DETACHMENT

1.CONTOUR

2 .EXTENT OF DETACHMENT

3 MACULA STATUS

4RETINAL BREAKS

A)VISUALISED OR NOT

B)TYPE AND LOCATION OF BREAK

5 FELLOW EYE EXAMINATION

1)ANY PHERIPHERAL DEGENERATION

INVESTIGATION

1.VISUAL ACUITY RE LE

DISTANCE

NEAR

RETINOSCOPY

BEST CORRECTED VISUAL ACUITY

2.FIELD

3.INTRAOCULAR PRESSURE MEASUREMENT

4.B SCAN ULTRASONOGRAM

SURGERY:

POSTOP -

ANATOMICAL ATTACHMENT

POSTOP VISUALACUITY

FOLLOW UP

KEY TO MASTER CHART

M - Male

F - Female

RE - Right eye

LE - Left eye

Ph - Phakia

PS - Pseudophakia

A - Aphakia

Ca - Cataract surgery

Tr - Trauma

Ref..st - Refractive status

M - Myope

HM - Hypermetrope

YAG - Yittrium aluminium garnet capsulotomy

Dur. - Duration of yag capsulotomy after surgery

S - Single break

M - Multiple breaks

Latt - lattice

HST - Horse shoe tear

RH - Round hole

OT - Operculated tear

Irr.T - Irregular tear

M.on - Macula on

M-off - Macula off

Quad - Quadrant

ST - Superotemporal

SN - Superonasal

IT - Inferotemporal

IN - Inferonasal

BCVA - Best Corrected Visual Acuity

HM - Hand movement

CFCF - Counting fingers close to face

A - Attachment

NA - Not Attached

E - Encirclage

S - Segmental buckle

CRY - Cryotherapy

R - Radial buckle

SRFD - SRF drainage

RD - Retinal detachment

MASTER CHART

S. No	Name	Age	Sex	IP No	Eye	Type	H/o Tr.	H/o Cat. Sx	H/o YAG Capsul	Dur. after YAG	Refr. Status	Fellow Eye	Pre op V/A	Dur. Of RD	Extent of RD	No of Breaks	Type	Loc	Ma	Surgery	Att	Func Outcome	Complic	R_X of Fellow eye
1	Srinivasan	65	M	480124	RE	Ph	-		-	-		P.Latt-RH	6/24	1w	2 Quad	M	Irr.T	ST	Off	E+S+CRY	A	6/60 NIP	-	Barrage laser
2	Chakkarapani	51	M	486391	LE	PS	-	Ca	-	-	-	-	1/2/60	1M	4 Quad	S	HST	ST	Off	E+R+CRY	A	2/60	-	-
3	Dhinakaran	35	M	48500	RE	Ph	-	-	-	-	M	WWP	1/60	10 D	2 Quad	M	RH	IT	Off	E+S+CRY	A	6/12	-	-
4	Santhanam	59	M	485005	LE	PS	-	Ca	-		-	RE Long standing RD	RE CFCF	2mn	2 Quad	S	Irr.T	IN	Off	E+S+CRY	A	2/60NIP	-	no Rx
5	Dhanraj	67	M	486382	RE	PS	-	Ca	+	2M	-	-	2/60	1 1/2mn	2 Quad	S	HST at IT	IT	Off	E+R+CRY	A	3/60	-	-
6	Yasodhai	70	F	484548	LE	PS	-	Ca	+	-	-	Long standing RD	PL+	15D	3 Quad	S	OH	ST	Off	E+S+CRY	A	PL+	-	no Rx
7	Manickam	45	M	48777	LE	Aph	-	Ca	-	-	-	-	1/2 /60	1M	3 Quad	M	1HST,1 Irr.T	ST	Off	E+S+CRY	A	3/60	-	
8	Muniammal	65	F	492824	RE	PS	-	Ca	+	5 M	-	-	HM	4M	2 Quad	S	OH	IT	Off	E+S+CRY+SRFD	A	3/60	-	-
9	Kumar	32	M	492829	RE	Ph	-	-	-	-	M	P.Latt-RH	1/60	20D	1 Quad	M	Latt-RH,1,Irr.T	ST	Off	E+S+CRY	A	6/24	-	Barrage laser
10	Baby	59	F	486914	RE	Ps	-	-	-	-	-	-	CFCF	5M	3 Quad	no br	-	-	Off	E+CRY+SRFD	A	PL	-	-
11	Lakshmi	58	F	487507	LE	PS	-	-	-	-	-	-	3/60	21/2M	3 Quad	S	HST	ST	Off	E+R+CRY	A	6/60	-	
12	Arumugam	62	M	40718	LE	PS	-	-	+	8M	-	-	1/2 /60	4M	3 Quad	S	HST	ST	Off	E+S+CRY+SRFD	A	CFCF		
13	Kumaravel	53	M	487157	RE	PS	-	Ca	-	-	-	-	HM	6M	4 Quad	no br	-	-	Off	E+CRY+SRFD	A	HM		
14	Ragu	47	M	488032	LE	PS	-	-	-	-	-	-	5/60	11/2M	3 Quad	S	HST	ST	Off	E+R+CRY+	A	6/36		
15	Meignanamorthi	55	M	488901	RE	PS	-	Ca	-	-	-	P.Latt-RH	HM	25D	2 Quad	M	HST,RH	ST	Off	E+S+CRY	A	6/12		LE barrage
16	Elias	68	M	488090	RE	PS	-	Ca		-	-	IMC	CFCF	3M	4 Quad	M	Latt--RH,Irr.T	ST	Off	E+S+CRY+SRFD	NA	HM		
17	Rahamadulla	14	M	488389	RE	Ph	-	-	-	-	M	M.Latt-	3/60	11/2M	3 Quad	S	HST	ST	Off	E+R+CRY	A	6/36		E

18	Johnwillson	22	M	481639	RE	Ph	Tr	-	-	-	-	-	6/60	1W	2 Quad	S	HST	ST	On	E+R+CRY	A	4/60		
19	Sekar	50	M	489620	RE	PS	-	Ca	-	-	-	-	1/60	2W	1 Quad	S	HST	ST	Off	E+R+CRY	A	6/36		
20	Gowri	55	F	489278	RE	PS	-	-	-	-	-	-	1/2/60	2mn	3 Quad	M	2 Irr.T	SN	Off	E+S+CRY+SRF D	NA	1/60		
21	chandrababu	27	M	483006	RE	Ph	Tr	-	-	-	-	-	3/60	2M	4 Quad	NoBr	-	-	Off	E+CRY	A	5/60		
22	Srinivasan	70	M	481700	RE	PS	-	Ca	-	-	-	-	HM	6M	4 Quad	S	HST	SN	Off	E+R+CRY+SRF D	A	1/60		
23	Sundhari	42	F	17995	LE	Ph	-	-	-	-	-	M	6/18	10D	1 Quad	S	HST	ST	On	E+R+CRY	A	6/36		
24	Sunil	30	M	473497	RE	Ph	-	-	-	-	-	-	PL	6M	4 Quad	M	Irr.T	ST	Off	E+S+CRY+SRF	A	CFCF		
25	Premkumar	58	M	491089	RE	PS	-	Ca	-	-	-	-	6/36	2W	1 Quad	S	OH	IN	On	E+S+CRY	A	6/60		
26	Silambarasan	19	M	493072	LE	Ph	Tr	-	-	-	-	-	1/2/60	3M	3 Quad	S	R.H	SN	Off	E+S+CRY+SRF D	A	6/60		
27	Reiyashahamed	26	M	492814	LE	Ph	-	-	-	-	M	Latt-Irr.T	5/60	1M	1 Quad	S	Latt-RH	IN	On	E+S+CRY	A	6/24		CRY
28	Meenakshi	16	F	464681	RE	Ph	-	-	-	-	M	Latt-	2/60	1M	3 Quad	M	1HST,1	SN	Off	E+S+CRY	A	6/24		barrage
29	Manikandan	22	M	491217	LE	Ph	-	-	-	-	M	-	1/2/60	11/2M	3 Quad	M	1 Irr.T,1 RH	SN	Off	E+S+CRY	A	6/24		
30	babu	35	M	493263	LE	Ph	Tr	-	-	-	-	-	1/60	20D	2 Quad	S	HST	IT	Off	E+S+CRY	A	6/60		

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